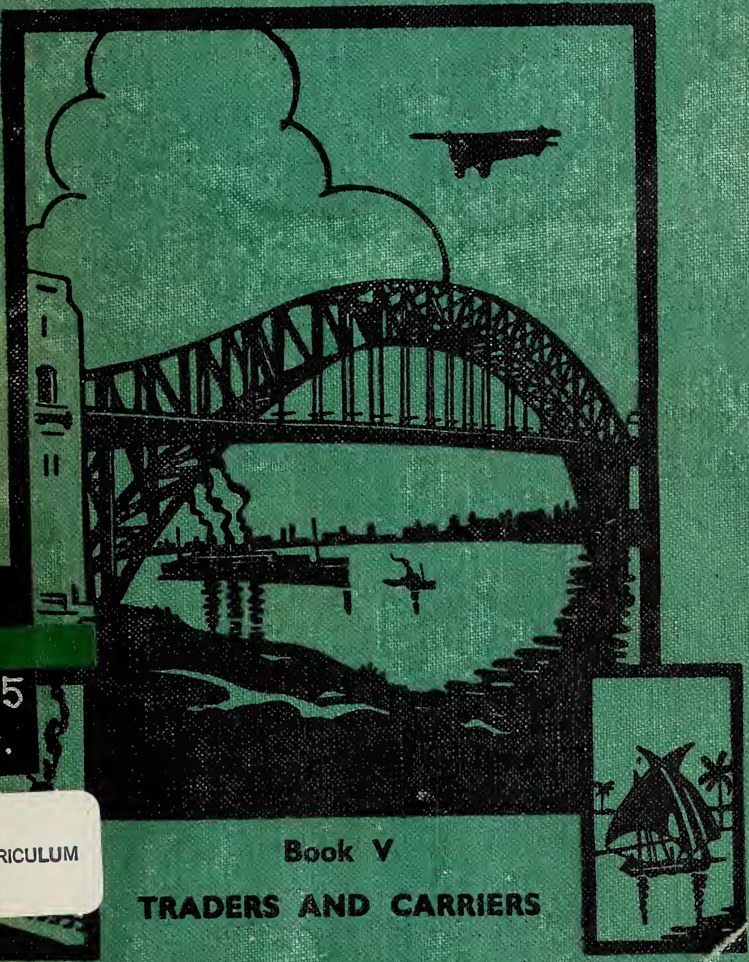
THE KINGSWAY SOCIAL GEOGRAPHIES

edited by ERNEST YOUNG



Book V

TRADERS AND CARRIERS

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BOOK V

TRADERS AND CARRIERS

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THE KINGSWAY SOCIAL GEOGRAPHIES

Edited by ERNEST YOUNG, B.Sc.

FOR SENIORS

BOOK V

TRADERS AND CARRIERS

by

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Geography Master, County School, Harrow Weald

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PREFACE

THIS series of five books, of which this is Book V, is intended for use by pupils from the age of about eleven upwards, and each book provides a course of work that should take about half the school year. The language throughout the five books has been kept as simple as possible.

The complete series covers the geography of the whole world, but it is not concerned with an excessive number of unrelated facts. By means of living races and present conditions it seeks to tell a continuous story of the evolution of culture. The material is, when suitable and available, taken mainly from different parts of the British Empire, but all the more important parts of the world as well as of the Empire are dealt with somewhere in the series.

The exercises are varied in difficulty in order that they may meet the needs of those different grades of ability that are usually to be found in one and the same class.

If geography is worth studying at all it is not for the accumulation of a mass of information, most of which will certainly be forgotten, and much of which may soon be out of date, but for the acquisition of a body of ideas that may leave some kind of permanent outlook upon life and its problems.

E. Y.

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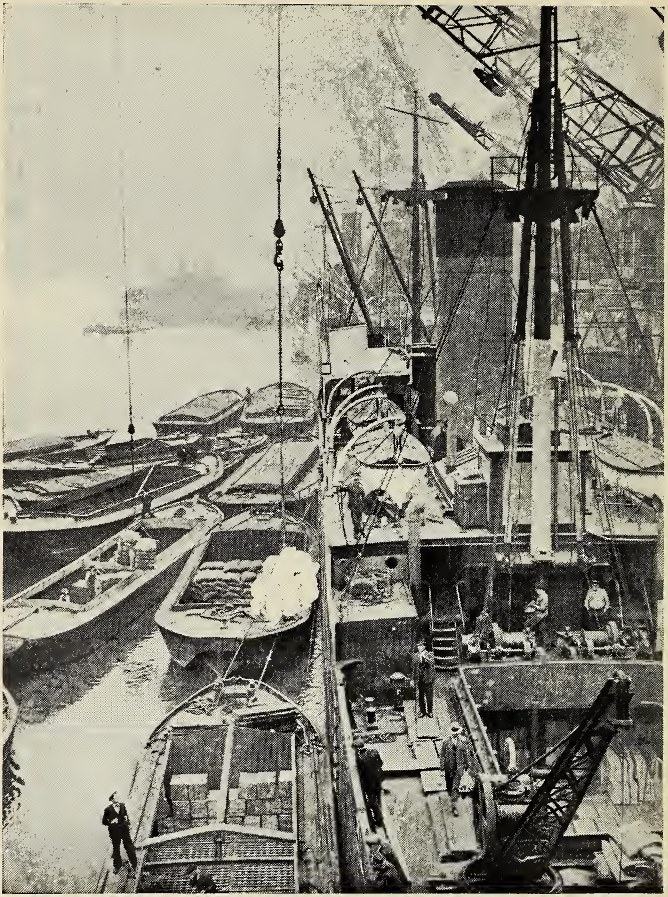


[Fox Photos.

A ship—one of the modern world's carriers of goods—being unloaded.

CHAPTER I

TRADE AND MONEY

WE all know how important to us are the people in our own town or village who keep shops. Our mothers are ever thinking about what they have to buy from the grocer, butcher, greengrocer, or baker to keep us well supplied with food, or where they can get good value for their money in order to keep us well clothed. If it were to happen that all the greengrocers in our town had no potatoes or the butchers had sold all their meat, we should have to do without these important articles of food until fresh stocks arrived.

But this was not always the case. At one time people grew their own food, and made, not only their own clothes, but everything else they needed. They had, like Robinson Crusoe, to be, as we say, self-supporting. What they could not grow or make they had to do without.

At the same time, there are few parts of the world where people do not exchange things of which they have too much for other things that they either need or would like to have. Even in the Stone Age men exchanged tools of one sort of stone for those of other sorts, as we know from the tools they left behind them. Such exchanges are still taking place in many parts of the world. For instance, the pygmies of the Congo Forest obtain part of their food by exchanging meat for bananas. They can get plenty of meat by killing wild game, but they have no bananas, of which they are very fond, because they do not cultivate them. When they want bananas they go to a plantation near the edge of the forest in which they live, pick a few bunches of fruit, and leave one or two lumps of meat with which to pay for what they have taken.

Exchanging one thing for another is the simplest form of

[Ewing Galloway, N.Y.

East African natives trading by bartering goods for other goods.

trade; it is called trading by *barter*. Barter is a very old and common practice. It was in this way that the Phœnicians, in ancient times, bought tin in Cornwall. They paid for the tin with coloured cloth and other things that pleased the Britons.

Barter was simple so long as people had only a few things to exchange, but, as we learned in Book III, the people who found out how to till the ground for food also made pottery, jewellery, weapons, and clothing. It then became too difficult to think out, every time there was an exchange of goods, just how much each article was worth. You can get an idea of the difficulty of trading by barter if you will think how you could exchange all the things you see in the markets and shops. For instance, how many potatoes would you give for an egg? Moreover, the man who has the egg might not want your potatoes.

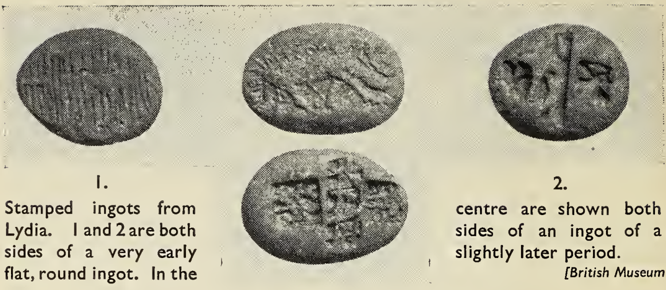
To make trading easy it is necessary to have some one thing that everybody wants and is willing to take in exchange for his wares. This thing we may call *money*, though it need not be coins, such as we use when we go to the shops.

In very early days the peoples in the lands where agriculture grew up, especially in Mesopotamia, used their crops as money. They weighed their grains of barley, and reckoned everything they wanted to exchange as being worth a certain weight of barley. But crops, as money, are not quite satisfactory.

In the first place, samples of, say, wheat are not all of the

[From the wall painting by Lord Leighton in the Royal Exchange.

Phœnicians bartering with the Ancient Britons.



Stamped ingots from Lydia. 1 and 2 are both sides of a very early flat, round ingot. In the centre are shown both sides of an ingot of a slightly later period.
[British Museum.

same value. One sample may be much better than another. In the next place, crops are not easily taken from place to place. The people of Mesopotamia soon came to see that though it was easy enough to exchange barley for things of little value, yet barley was much too bulky to be carried about when they wanted to exchange it for things of great value.

Hence gold and silver, of which small pieces were worth a great deal, came into use among people who did much trading with their neighbours. The metal was made into *ingots*, or bars, and was carried either by camel caravan or by sea. There was, however, still a difficulty. The ingots were not all exactly alike, and every time anything was bought or sold the ingots had to be weighed to see how much they were worth. This caused much delay.

Then, about eight hundred years before the birth of Christ, a clever trading people, of Lydia, a country in Asia Minor, thought of a way out of this difficulty. The king ordered a great number of ingots to be made of exactly the same quality and weight. These were stamped with a special mark, and so could be taken in payment by anybody, because it was known, by the mark on them, just what was their value. From that

[British Museum.

Early English coins: left, both sides of a penny of the time of King Alfred (871-900); right, both sides of a penny of the tenth century.

time onwards all civilised people have used " coins," though others went on using many kinds of curious things.

The people who made and stamped the ingots soon found out that flat, round pieces of metal were easier to carry about and reckon with than bars. Quite soon, too, they began to make coins, not only of gold and silver, but also of copper, since there were many things which they wanted to buy and sell which were not worth so much as a silver coin. It is easy to see that of all kinds of money, the most suitable are metal coins. They are not easily destroyed, are portable, and can be made of uniform quality and of different values.

The making of coins in Britain was begun by the ancient Britons. They struck gold coins at least two hundred and fifty years before the Romans conquered the country, and coins have been used in Britain ever since.

The faces of coins are usually stamped with the ruler's head on one side and a design on the other. This is not merely that they may look pretty, but rather to make it more difficult for dishonest metal-workers to manufacture imitation money out of a cheaper metal: money must not be easily imitated.

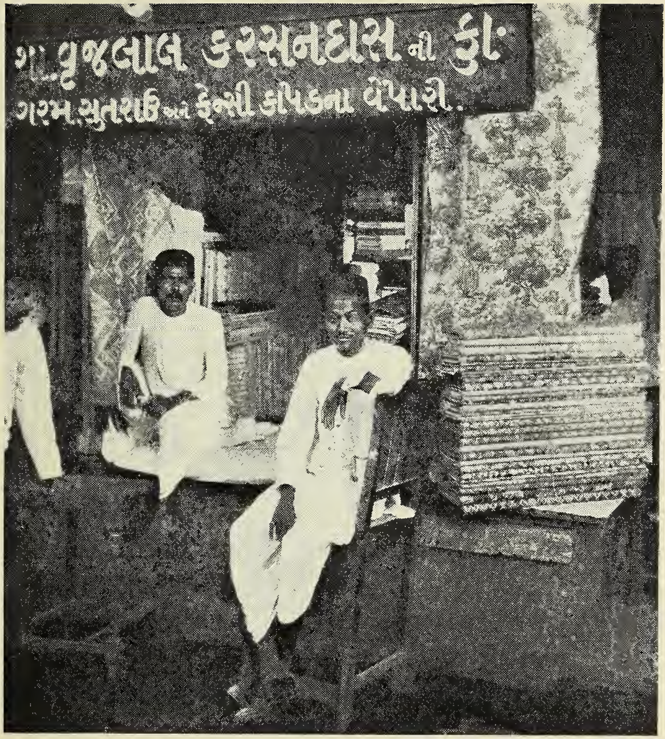
In fact, every Government that mints its own money tries to do so in such a way as to make imitation difficult, and orders severe punishment for those who forge either metal coins or paper money.

Paper money came into general use in Britain, in place of gold sovereigns and half-sovereigns, during the Great War of 1914–1918. Before that time the most famous British coin was the gold sovereign ; it was known and accepted all over the world.

Money is a very convenient thing, because with it one can easily reckon how much a thing is worth. As we can see, suitable money is something which, in most countries, anyone will give or take in exchange for goods; it is easily recognised; for all ordinary purchases it is easy to carry about; and, most important of all, it is made by the Government, and people trust the Government to give them coins and paper money that are good tokens for exchange.

To us it does not matter whether a penny contains more or less than a penny's worth of bronze, because a coin has no value of its own. Robinson Crusoe refers to coins as " vile dross "; on an uninhabited island, where there is no chance of spending anything, money becomes merely a useless ornament. A penny would be a rather senseless gift to a South Sea Islander, but in England we know that it is worth a bar of chocolate, or a daily newspaper, or a ride on a bus, and no tradesman would think of weighing it to see whether he was receiving his full value of bronze. Even though it be very worn and thin, he knows that he can pass it on to others without any questions being asked. Money is just a token, something that can be exchanged for things we need, and a ten-shilling note is worth ten shillings, although it is made of almost valueless paper.

Each country has its own special coinage. Foreigners find it hard to reckon in pounds, shillings, and pence, just as we should find it hard to reckon in German, French, or American coinage. How do business men who trade with other countries know how many marks or dollars or francs are worth a pound of our money ? If you look in your newspaper you will find a


ગા. વૃજલાલ કરસનદાસ ની કં.
ગરમ, સુતરાઉ અને ફેન્સી કાપડના વેપારી.

[Ewing Galloway, N.Y.

Cotton materials made in Manchester on sale in a shop in Bombay.

column there which tells you how much a pound is worth each day in the coins of other countries. When we want to go abroad we need to exchange our English money for that of the country we are about to visit. This is done for us by the banks, by tourist agencies, and by men who make a business of changing money.

For the payment of large sums, even coins are not suitable. They are too heavy. We have already spoken of notes made of paper. Such notes are chiefly of value in the country where they are made. For trade between one country and another other means of buying and selling are in use, but of these nothing will be said in this place.

The important thing to remember is that all the business of buying and selling by merchants and shopkeepers has grown out of barter, and that life, as we know it to-day, would not be possible without trade. The nations of the world now all depend on one another for raw materials, food, and manufactured articles. Each nation has something to give that other nations need, and needs something that other nations can supply. And anything that stops or hinders this exchange makes life less easy for some or all of them.

EXERCISES

1. What is the meaning of: barter, trade, commerce, coins, money?

2. Remembering that a farmer says he owns so many *head* of cattle, try to explain why the word *chattels* (meaning possessions), *capital* (meaning wealth), and *cattle* all come from the same word meaning *head.*

3. Look up the word *pecuniary* in the dictionary. Explain how it comes to us from a Latin word (*pecus*), meaning cattle.

4. A dishonest silversmith forges a two-shilling piece out of a base metal which costs him sixpence. With it he buys bread from a baker. The baker spends it at a butcher's. The butcher takes a ride in a train, and passes it on to the railway booking clerk. When the railway company pay their daily takings into a bank the florin is found to be worthless, and it is confiscated. Make a list of the people who handle the coin, and opposite each write down how much each gains or loses because the coin is a forgery.

CHAPTER 2

SIMPLE TRANSPORT BY LAND

WHEN we speak of trade or commerce we have to think about the work of three different groups of people.

1. *The Producers.*—These may be hunters who supply furs, fishermen who supply fish, herders who supply milk, meat, wool, and skins, cultivators who supply grain, fruit, vegetables, and some raw materials like cotton and flax, and manufacturers. The work of all these kinds of people has been described in the first four books of this series.

2. *The Buyers and Sellers.*—These are the people who exchange the things that are produced by using one of the forms of money described in the last chapter.

3. *The Carriers* are the people who bring the goods from the places where there is a surplus to the places where they are wanted. Without the carriers, the buyers and sellers would be unable to obtain the wares of the producers.

Carrying is performed in a number of different ways. In this chapter we shall speak only of the simplest.

From the very earliest times down to the present day, one thing has always had to be carried—the baby. The human baby takes a very, very long time to learn to walk, and much longer to walk well enough to keep up with a tribe on the march. So woman, who carried the baby, was, even in the Old Stone Age, the first carrier. Besides the baby she also carried water and firewood, and anything else her husband might want. The man had to have his hands free to hunt and fight.

Because the woman had not only to carry the baby and other things, but also to gather berries and grub up roots for food, she, too, needed to have her hands free. So she invented ways of tying the baby with skins and slings on her back, and her back became the place on which other things could also be fastened, instead of the baby, when the tribe moved.

There are some places in the world where all goods have even, up till now, been carried on the backs of human beings. In the wilds of Central Africa, where dense forest makes it difficult to move about, and in places where the tsetse fly kills such animals as the ox, horse, ass, or dog, all the carrying is done by men and women. The things to be carried are made up into loads small enough to be transported on the heads or backs of human porters. This sort of transport is slow and costly, for, since man cannot be " turned out to grass," and there are no hotels or shops along the route, enough food has also to be carried to last the journey out.

In many parts of Asia, especially in China, goods are carried in this way, because it has always been the custom of the country, and transport animals have not been bred. The population is dense, grazing land is scarce, and labour is cheap, so the custom still goes on. But the motor-lorry is now being used in China, and even in the tsetse region of Africa the lorry is finding its way, though it cannot be used to push through the forest.

In many parts of the world some goods are still carried. In British railway stations railway porters may, at times, be seen with heavy loads upon their backs. On the road are men and women " hikers," Boy Scouts and Girl Guides also with packs on their backs. Everywhere people carry small parcels in their hands, and each of us began our own transport in life in the most old-fashioned way in the world, in a woman's arms.

Somewhere, and at some time, but we do not know where or when, man found out that it was easier to drag a load than to carry it. At first rough sledges without wheels were used, not as now, only in cold countries, but in countries such as Egypt and Mesopotamia.

The first really great step forward in transport was made when the wheel was invented, but, again, no one knows when or where. Very likely the idea of the wheel grew out of using a rounded tree branch as a roller. The Dyaks of Borneo still move heavy tree trunks (for the making of canoes) from the forest to the river by hauling them along over rough rollers made of branches. Movement in this way is very slow: the rollers that are at the back have, time after time, to be moved forward and laid down in front.

One thing at least is certain: the wheel was not invented in Egypt. Quite recently, at Ur, in Mesopotamia, chariots that were drawn by asses, and wagons that were drawn by oxen, have been found in a way which shows that they were being employed in Mesopotamia two thousand years before the wheel was introduced into Egypt. These early wheels had no spokes or hubs: they were solid and heavy.

Because oxen and asses were the first animals used for drawing wheeled carriages, the heavy, solid wheels did not matter very much. But when the horse was introduced into Mesopotamia, nearly two thousand years later, the heavy wheel mattered a great deal. The horse could run swiftly only if the chariot it drew was light, and, very likely,

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Women carrying heavy loads.

this led men to improve the wheel by using spokes to make it less heavy and by leaving it free to turn on its axle. What is most interesting is that from the time the spoked wheel was invented, about 3,700 years ago, right down till the invention of the railway, no very great improvement was made in transport.

Though the wheel was known in the civilised ancient world and its use spread outwards over Europe, Asia, and Africa, it was quite unknown to the Indians and Eskimos of America until Europeans landed there. In the frozen North sledges were used. Farther south, on the prairies, the Indians fastened their tent poles on the sides of the dog and, later, the horse, making a V point on the animal's back, and leaving the ends dragging on the ground. The skin cover of the tent was rolled up and tied across the open end of the V. Traces have been found of this simple way of dragging things in olden times in Europe.

The kind of animal employed to carry or drag depends very much on the geography of the country. In the grass-lands, such grass-eating animals as the ox, ass, and horse are employed.

The ox was the first animal of real importance in dragging carts; its great strength enabled it to pull heavy loads, and though its pace seems very slow to us, to ancient man, who knew no quicker ways of transport, that did not matter. There are still many places in the world where the ox is the chief transport animal. In lands round the Mediterranean a single ox, or two oxen, draw carts laden with goods to the local market; in South Africa teams of a score of oxen are yoked to much heavier loads, and plod along with natives shouting by their side.

The ass and the horse are more delicate, need greater care, and, above all, are much swifter than the ox. They were, therefore, used at first for men to ride on or as " pack " animals.

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A cart, with heavy, solid wheels, drawn by oxen.

The horse was so much swifter than the ass, and could so easily be trained to be man's companion as well as his servant, that its use soon spread wherever sufficient grass and water could be found for it.

It helped the warrior to fight his battles, the herdsman to round up his cattle, and the huntsman to pursue his prey. Until machinery was invented, the quickest way to move about was on the back of a horse.

In the England of the olden times roads were very bad, and it was easier to carry goods in baskets and panniers slung on either side of a horse than in carts that might get stuck in the mud or be too wide for narrow lanes. Grain and wool were taken to market in this way, and even coal was carried from the pit to the iron-works, or to the houses of those who could afford to buy it, in the same way. In the Pennines and other parts of Britain one can still follow the old pack roads and see the narrow high-arched bridges by which they crossed the streams. In many parts of the world where roads are not yet made, horses continue to carry packs.

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A pack-train of donkeys on a mountain road in Venezuela.

Where, however, pasture is poor or roads are mountainous, the hardy, sure-footed little donkey is used. In Spain, a rather dry country, the donkey is the commonest animal, and long strings of them may be seen at all hours of the day, even in the big cities like Madrid. Spain is also so badly supplied with roads that there are many villages which have no roads at all connecting them with the rest of the country. In such parts the donkey, threading its way over rough tracks from one village to the next, is a very valuable animal.

In time men bred a new animal—the mule. The mule is as hardy and sure-footed as the donkey and has the strength and courage of the horse. Though it has never been as tame or intelligent as the horse, it has one great advantage over the latter animal: its skin is much thicker. Hence it can draw loads in lands where the hot rays of the sun or very heavy rains would injure draught-horses.

Mules, in ancient Greece and in many parts of the world to-day, are used as pack animals. A well-trained mule will carry, over mountain paths, one-third of its own weight and cover about fifteen miles a day.

In desert lands the camel is the pack animal: the horse could not stand the drought, the heat, and the lack of grass. The wide-spreading feet of the camel prevent it sinking in the sand; it can feed on the prickly shrubs that grow in dry lands, and go for three days without drinking anything at all. The great heat of the desert sun by day and the sharp cold of the nights do not upset it.

An Arabian camel can carry a load of from five hundred to one thousand pounds for twenty-five miles a day, while a riding camel can travel one hundred and fifty miles in a day. Trading caravans of camels travel far into the heart of the thirsty lands carrying dates, figs, salt, and carpets. They depart at regular times, rest at night in regular camp-grounds, and break

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A heavily laden camel caravan rests on its way across the desert.

up at fixed places, where desert tracks part from each other, into smaller caravans that go different ways. Camel caravans have been the goods trains of the desert for centuries, but the motor-truck is already beginning to replace the camel in many parts of both Asia and Africa.

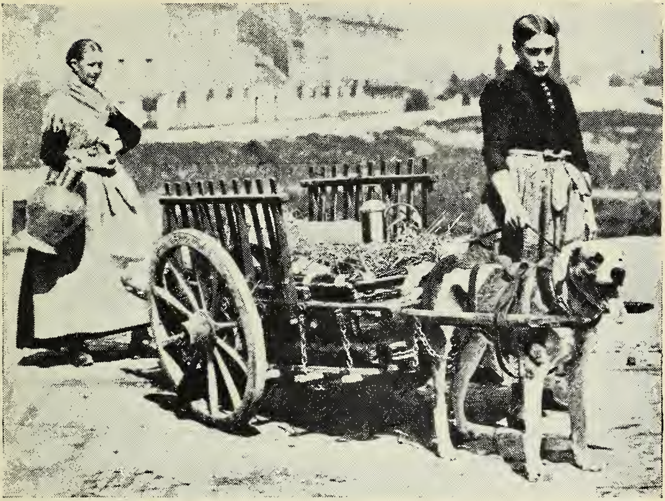
In the frozen deserts of the North, none of the animals we have mentioned can live. Many tribes in the Arctic lands have tamed the reindeer and use it either as a pack animal or to pull loads.

A good reindeer team can cover ten to twelve miles an hour all day long. The animals feed on the moss beneath the snow by scraping the snow off with their broad hooves, and the harder the snow and the colder the day the better will they run. When summer comes and the snow is soft and slushy, sledges cannot be used, and goods have to be carried in packs on the backs of men, reindeer, or dogs.

The dog, probably, helped man to pull loads at a very early date. But it is so small and has so little strength that it is not often trained when any other animal can be employed. Its light weight, however, is just what is wanted in snowy regions, since heavier animals would sink. Hence, in the Arctic regions of Europe and Asia the dog is used by many tribes to pull sledges over the snow. It does not, like the reindeer, need a special sort of food and can live, like its master, on meat or fish.

In the hot, moist lands of southern Asia, and especially in India, the elephant is used to drag loads. It is very strong, and can, therefore, push its way through tangled jungle, and it is most intelligent. It has been much employed in dragging heavy loads for roads and bridge building. But it has not, like the horse, spread widely, partly because it has a very big appetite, and needs a great deal of fresh vegetable food every day, and partly because it soon falls ill in lands where the climate is different from that of its own home land.

Other transport animals, such as the llama and the yak, are



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A milk cart in Belgium drawn by a dog.

even less widely spread than the reindeer and the elephant. The llama is used in Peru as a pack animal for great heights. It can carry only about one hundred pounds, and cannot pull at all, but it is not troubled by the cold or the lack of oxygen. In Tibet the yak, as well as the ox, draws carts and carries loads.

EXERCISES

1. Make a list of the transport animals that are used (*a*) for carrying, (*b*) for hauling loads without wheels, (*c*) for drawing carts. Opposite the name of each animal write the name of one country where it is used.

2. Cattle are to be found in large numbers in Denmark, South Africa, and the Argentine. State for what purpose the animals are kept in each case.

3. What is the chief transport animal used in the following regions: Lapland, England, Southern Italy, the north of Canada, the Sahara, and Spain?

4. On a map of the world mark the Arctic regions, the grass-lands, the deserts, and the monsoon lands. Write or print in each region the name of the animal best suited to it for transport.

CHAPTER 3

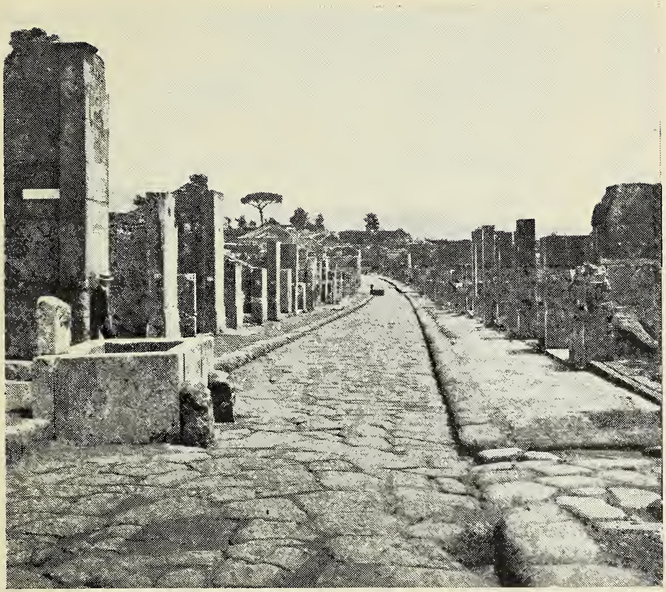
ROADS AND BRIDGES

BEFORE wheeled vehicles were invented the land-roads were mere trails and paths suitable only for people who travelled on foot or for animals carrying packs or passengers. In some rough mountainous regions there are still no other kinds of roads but these trails.

Trails and paths, however, will not do for wheeled vehicles which need, as a rule, well-made roads. In some regions, such as the veldt in South Africa or the prairies of North America, where the rainfall is not heavy and the ground is fairly level, carts and wagons can be hauled across the open country, but movement is slow. In other regions, where there is much rain and the ground is often wet, heavy carts would churn up the soil and sink, axle-deep in mud, unless special roads were provided.

The making of firm, solid roads began in the early history of mankind. As long as six thousand years ago the Egyptians constructed a road along which to transport the stone that was to be used in the building of the Great Pyramid, but there were no good roads in Britain till the Romans made them. The Romans were great road builders. They knew that if a road was to last it must be well drained and have a firm foundation and a fairly smooth and hard surface.

They first dug a straight trench about ten or fifteen feet wide and nearly a yard deep. Into this they threw a layer of stones each about the size of a cricket ball or even larger. On the top of this they shovelled another layer of lime and smaller stones to a depth of about nine inches. Then they laid down a third layer of smaller stones, broken bricks, and pottery and more lime. This was well rammed down and, in time, set into a solid mass like concrete.



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A road built by the Romans in Pompeii.

The last, or surface layer, consisted of pieces of hard rock all fitted neatly together to form a fairly smooth pavement. On each side of these straight highways was a raised pathway for the use of those who travelled on foot and, at regular distances, there were stone blocks to help horsemen to mount their horses, and milestones that marked the distances from Rome.

The Romans laid down several of these splendid roads in England. One of them, Watling Street, ran from Dover, through Canterbury to London, and then on to Chester, which was an important garrison town. The Fosse Way extended from Devon to the Humber and the Icknield Way from Land's end to Norfolk.

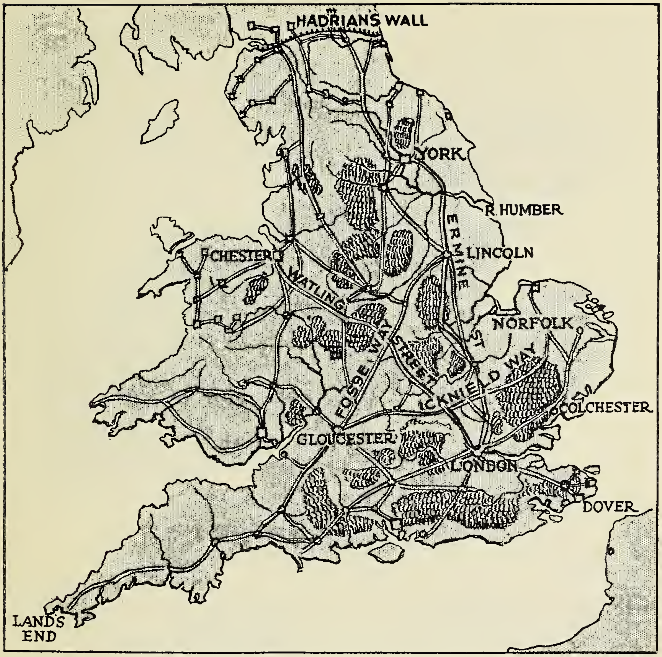
The Romans built these roads not for the use of traders, but of soldiers, so that the latter could march quickly to any place where they were needed. Sometimes a chariot might pass along them, but, on the whole, they were not much used by wheeled vehicles. It was, perhaps, for this reason that they were made in straight lines over hill and dale. A man can walk up a slope that would be difficult or even impossible for a horse and cart. At the same time wide bends were sometimes necessary in order to avoid marshes or forests in which British rebels and wild animals might be hiding.

After the Romans left England little use was made of the old roadways. There was no one whose business it was to look after them, and they became so overgrown that, in many places, their position was completely forgotten.

One of the difficulties that had to be faced in building a road in a country like Britain was caused by the streams and rivers. At first these were crossed, if possible, in places where the water was shallow enough to allow men on horseback to " ford " the stream. Towns and villages tended to grow up at such places, and names like Oxford and Chelmsford tell of the former use of the streams in this way.

Later on, bridges were built. England may have neglected her roads, but for long centuries she built bridges and kept them in repair. However well a bridge is built, it needs constant care to keep it in order. The trampling of horses' hoofs and the passing of people tend, in time, to crack even the strongest stonework. The lapping of the waters on the foundations, the rush of floods, heavy storms, summer heat, and winter frost all do great harm.

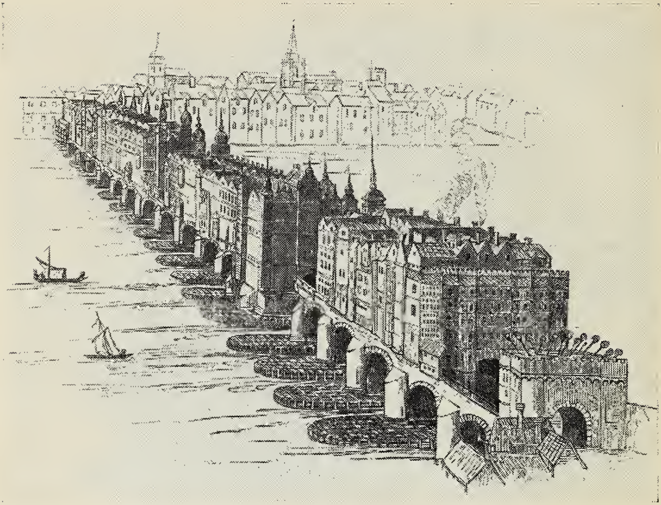
The cost of the upkeep was met in different ways. Some bridges paid for themselves. Houses and shops might be



Map of England showing the Roman roads.

built on them and their rents spent in repairs to the bridge. Most bridges charged a toll and had a gateway and toll-house to make sure that no one went over the bridge without paying.

The most famous British bridge of olden times was London Bridge. It had such narrow arches that ships could go no farther up the river. As they came in on the rising tide they were stopped by the piers of the bridge, which dammed up the stream like a mill-race. From the bridge busy roads led in a number of directions, and along these went the goods brought



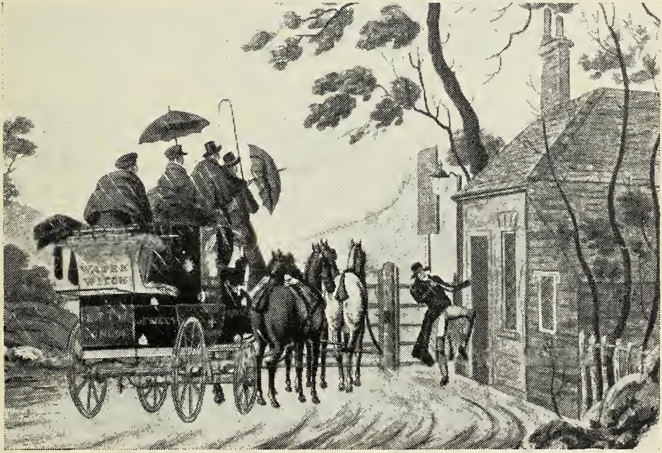
Old London Bridge. Notice the narrow arches and the buildings on the bridge.

in or taken out by the ships. Near the bridge merchants and sailors met to do business, and round it the city of London began to grow. In other parts of England, as at Bristol, and in other parts of the world there are many towns that began in this way: they are sometimes called *bridge-towns*.

Here and there in England beautiful stone bridges are to be seen which have survived for seven or eight hundred years, showing the constant care given to them. But most of our bridges date from the time when engineering of a modern type made it possible to build better bridges, which interfered less with the flow of the water, which were wider and longer and which could be made of iron and, later, of concrete.

As we have said, there was a long period in English history when the roads were badly neglected; this was partly because the only people using the roads were foot travellers, horsemen, and mounted pedlars whose pack animals carried their wares. For such forms of travel good roads were not needed and, as years rolled by, the roads became worse and worse.

Later, toll gates were placed across the roads as they were at the bridges, and anyone passing through with a cart or with animals had to pay a small sum. The money that was collected was spent in patching up the roads, but, even so, the highways were in a shocking state. Towards the end of the eighteenth century travellers who made long journeys did so in fear of their lives. The roads were often quagmires of mud, with ruts so deep that a coach was likely to overturn; when such an accident took place there was often a highwayman near at hand to rob the passengers.



[From the painting by Newhouse.

A stage coach waiting at the toll gate.

In England, at the time when the roads were so poor, the usual way of carrying goods about the country was something like that still employed on the veldt of South Africa, except that from four to six horses took the place of a score of oxen. Heavy wagons were used, and they had to be solidly built or they would have fallen to pieces as they jolted over ruts. The driver did not drive, for there were no reins. He rode either on the leading horse or on a pony alongside and urged on the team with a long whip. The roof of the vehicle was formed by a waterproof sheet stretched over a number of wooden hoops; under this the merchandise was packed and passengers huddled down on a bed of straw.

In wet weather these wagons were always getting stuck in the mud that they helped to churn up. Then it was discovered that if the wheels were widened there was less chance of such disasters. Hence wheels were made wider and wider until some of them were more than a foot thick.

Wealthy people travelled in coaches, but as the coaches had no springs they were not very comfortable. They were also few and slow. The only way of going from London to Edinburgh was by a coach that set off only once a month and took nearly a fortnight on the journey.

Speedy transport remained impossible until the roads were improved. The improvement began in the early years of the last century, and was due to the work of two engineers, Macadam and Telford. They were the first men since the days of the Romans to build good roads in Britain.

As roads improved, transport became faster and better, and before Telford and Macadam died, stage-coaches were running from London to Exeter at an average speed of ten miles an hour. The life of the stage-coach, however, was a short one. Soon a network of railways was made throughout the country, and as goods and passengers could be carried more quickly and more cheaply by this new method, the coaches and transport

[Rischgitz.

A heavy wagon such as was used at the beginning of the nineteenth century for carrying goods.

wagons disappeared. After this the roads were little used for travelling long distances until the motor-car made its appearance.

The first road carriage to be driven by a machine was built by a Frenchman, but, unfortunately, it knocked down a wall and the inventor was sent to prison; nothing more was heard of his invention. The first man to succeed in England was a Cornishman named Richard Trevithick. He built the first locomotive, the first steam dredger, and the first steam road carriage.

On Christmas Eve, 1801, Trevithick gave his carriage a trial and, to his delight, it went quite well. Unfortunately, four days later it was set on fire and destroyed. He built another and took it to London by sea: the roads were not good enough for him to drive on. In London the new steam carriage was looked upon as a great wonder, but no one wanted to buy it and, for a time, no more were built.

[Courtesy, L.P.T.B.

Modern motor coaches. Compare these with the stage coach on page 31.

As the years went by better steam coaches were constructed which carried a certain number of passengers, but such heavy tolls had to be paid that the owners of the coaches could not make the business pay. Some of the toll charges for a steam coach were as high as two pounds, whereas, for a horse coach, they were only three shillings. As a result the number of steam passenger coaches on the road became fewer and fewer, until at last there were none left.

The use of traction engines for hauling heavy loads of goods was, however, increasing, though they met, like the steam coaches, with a great deal of opposition, especially from the railway companies, and in 1865 a very foolish Traffic Act was passed in Parliament. This Act said that in the case of every mechanical vehicle, at least three persons must be in the driving cab, the speed must not be greater than four miles an hour, and a man, carrying a red flag, must walk a hundred yards in front of it. This act stopped the growth of mechanical transport in England for thirty years.

In France and Germany, on the other hand, there was no such silly law, and great progress was made. In 1885 Daimler invented the petrol engine, and, seven years later, the first motor-car was made. After this the use of mechanical vehicles grew rapidly, but it was not till 1896 that the "red flag" business was ended in England, and British engineers could really begin to make motor-cars and lorries for use at home.

Since those days road transport has changed tremendously,

A milk tank in which milk is brought to London by road.

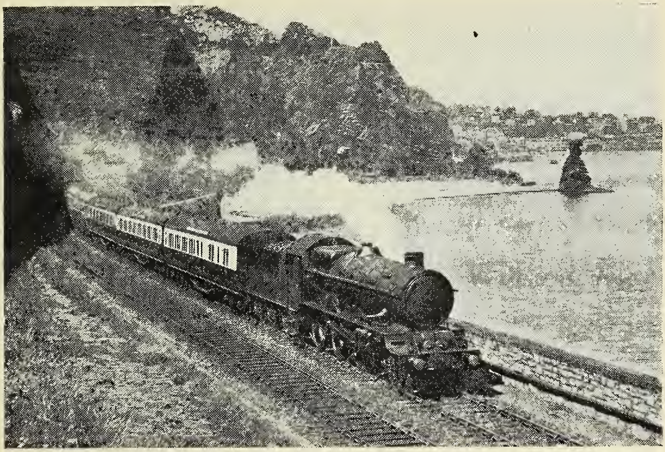
and there are now so many motor-cars that they are a serious rival to railways. In all directions, all over the country, coaches run to a regular time-table and are well filled with passengers. It is now possible to go from London to Edinburgh in one day, the four hundred miles being covered in fifteen hours. In addition, one person out of every thirty, on an average, owns his own car and can go wherever he pleases.

The number of road vehicles, and the speed at which they travel, has increased so greatly that the old roads have proved to be too narrow and too winding for safety, and thousands of miles of new, concrete, arterial roads have been constructed across the country.

The growth in the use of the roads is not all due to the transport of passengers: some of it is due to the carriage of goods. Motor delivery vans have taken the place of the tradesmen's carts, and many firms producing even heavy and bulky material find it pays them better to own their own lorries and transport their wares by road rather than send them by train. Lorries full of bricks are sent to London from the brick-works at Peterborough; a good deal of the wool unloaded in the London docks is now taken to the Yorkshire mills by road, and even milk produced in Somerset is conveyed to London by motor in specially constructed tanks. A train actually runs faster than a lorry, but on a cross-country journey so much time may be wasted in a goods yard that it is often quicker to send merchandise by road.

EXERCISES

1. Make a list of all the wheeled vehicles you know. After the name of each vehicle put the number of wheels it has.
2. Try to find out how much it costs to build a mile of the arterial road nearest your home. How often has the surface of the roads in your town to be repaired ?
3. How many people were killed or injured in your town last month ?
4. On a map of Britain mark the chief Roman roads.



[Courtesy, G.W.R.

An express train emerging from the tunnel through the cliffs at Dawlish.

CHAPTER 4

RAILWAYS OF GREAT BRITAIN

WE have already seen that, until about one hundred and fifty years ago, travelling in England was slow, dangerous, and uncomfortable. Before any improvement could take place, two things were needed—a better kind of road and a better kind of horse. These were obtained in the form of the railway and the locomotive; but the first railways were not made for the use of passengers. The engineers were not interested in the carriage of people, but of coal, and, for many years, it did not occur to them that the railway trains would ever become the rivals of the stage-coaches in taking passengers about the country.

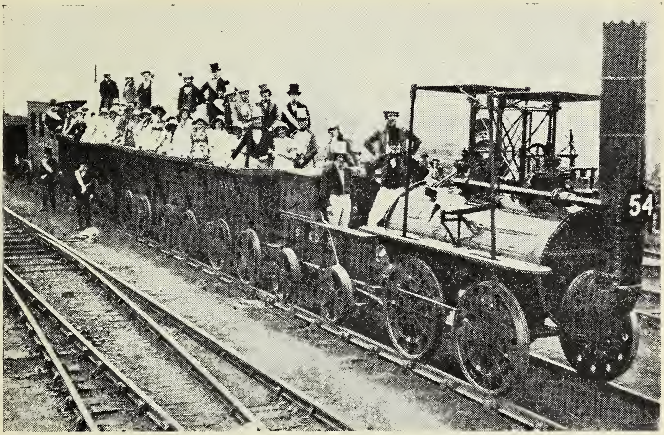
Coal was sent, as early as Tudor times, from Newcastle to London, and was carried all the way by water. This was an easy and cheap method of transport, and was possible because both Newcastle and London were, by means of their rivers, in touch with the sea. Where, however, a pit was not alongside a navigable river, coal was taken to the wharf in panniers loaded on pack horses. This was neither easy nor cheap.

Later on roads were made, and horses pulled coal along them in carts. This was an improvement, for one horse could haul a ton of coal about ten miles a day, but, again, it was not cheap: the cost of a ton of coal was increased by 2*s.* 6*d.* for every mile it was hauled.

The heavily laden carts quickly destroyed the roads. In order to make the roads firmer, lengths of timber were laid down in two parallel lines. The cartwheels ran along the strips of timber, the outer edges of which were raised an inch or two to keep the wheels on the rails. This was another improvement, but the timber soon became splintered and worn. It had to be covered with iron plates. The tracks were now known as " plateways," and the men who kept them in repair were called " platelayers." This name is still given to the men who look after the rails of a modern railway.

About the end of the eighteenth century rails came into use, and the wheels of the trucks were fitted with flanges on the inside to keep them on the track. All this time, however, there were no steam engines on the railways. Wagons were hauled by horses. Sometimes, in hilly country, the horse pulled the loads up the slopes, and then stepped into a truck and went down, with the train, on the other side.

Trackways or railways of the kind described were laid down in other parts of the country besides the coal-mining districts. They could be used, as other roads were, by anyone who cared to pay the toll. Gentlemen mounted their carriages on



[Keystone.

Locomotion No. 1, one of the first engines to be built. The passengers are dressed in the style of the period, and are travelling in the trucks which served the early trains as passenger carriages.

special wheels and drove along the lines, and even stage-coaches used them. There was only one track between two given places, but there were sidings here and there to enable the traffic to pass to and fro. There were no special time-tables, and when the drivers of rival coaches coming from opposite directions met each other, there was a great deal of fierce argument as to which one should back his vehicle into the siding.

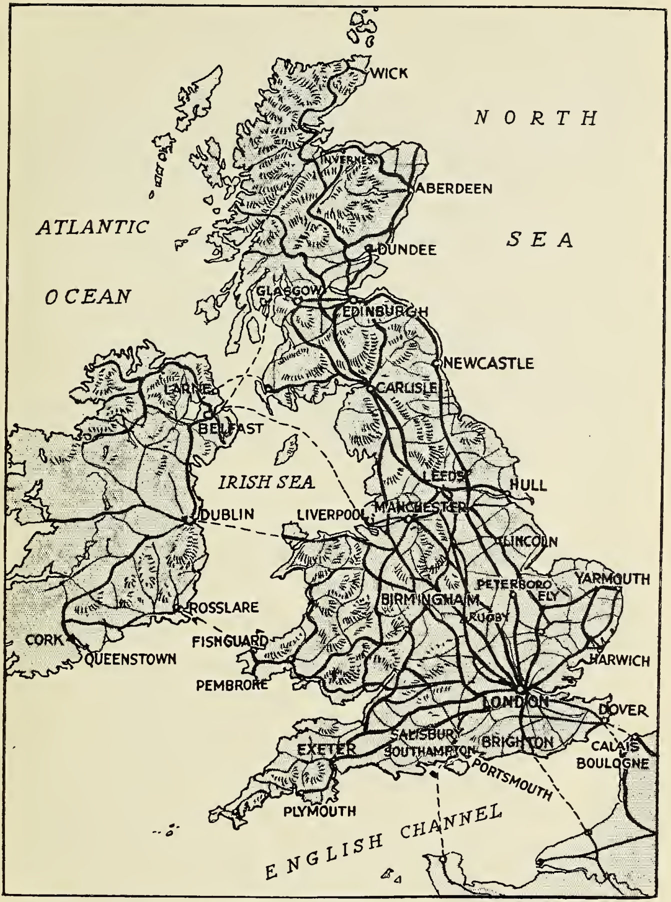
It is interesting to note that these early railways for horse-drawn vehicles grew out of the use of the ordinary roads, and the distance between the rails is, to this day, in Britain, the same as that between the wheels of Roman chariots.

We next come to the story of the better horse—the locomotive. The first locomotive was built by Richard Trevithick in 1804. It ran on a tram-line in the coalfield of South Wales, and could haul ten tons of coal and seventy passengers at a speed of about five miles an hour. Unfortunately, the engine was too heavy for the track, and the owners of the mines would not strengthen the line. Nobody seemed to care very much whether this new form of transport succeeded or not. About eight years later, however, Hedley, an engineer at Wylam Colliery, in Northumberland, built three engines that worked really well : the *Lady Mary, Puffing Billy* (now in South Kensington Museum, London), and *Wylam Dilly* (now in the museum at Edinburgh).

The invention of the locomotive received no great welcome from those for whose use it was intended. In fact landowners, canal companies, and the owners of stage-coaches were all opposed to it, and when Parliament gave permission to build the Newcastle and Carlisle Railway they did so only on condition *that no engines should be used on it !*

We have not space in which to tell of those improvements in the locomotive that have given us the strong, speedy giants of to-day. But we may note that, until the invention of the locomotive, the rate of travel remained practically the same as it was at the dawn of history when man first tamed the horse. Quick movement is a very modern thing.

The first railways in Britain, as in most other parts of the world where there were many people, were, as a rule, laid down between those cities where there was a dense population and many goods to be carried, for they had to " pay their way." Before they could be built the land had to be carefully mapped so that the tracks could be as level as possible. In slightly hilly country cuttings were made through the higher parts. The earth that was removed from the cuttings was taken to the lower ground to make the embankments. When the country was more hilly or mountainous the lines followed river valleys and made use of gaps in order to cross the barrier. If there



Map of the British Isles showing the main railways.

were no gaps, or if they were too high, tunnels had to be bored. All this meant a great deal of labour and expense, but once the level track had been made the trains could travel easily and quickly.

The first railways were short and not joined together. In time the short lines were linked together to make routes that went right across the country. Because London was the most important town, the chief port, and the capital, all the long railways ran to London, but not to the same station. The different railways were finally united into four greater ones:

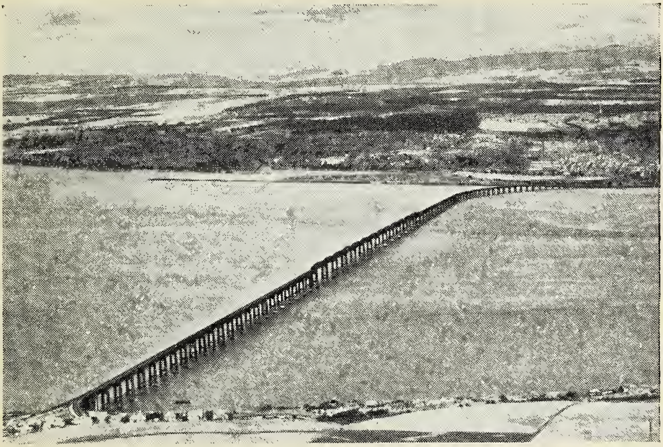
1. London Midland and Scottish (L.M.S.R.).
2. London & North Eastern (L.N.E.R.).
3. The Southern (S.R.).
4. The Great Western (G.W.R.).

Each system has its own terminus in London. Some of them have two or more main lines, which are run almost as separate railways, each with a different London terminus.

A relief map of Britain shows that the Pennine Moorlands and the Cheviot Hills form a barrier across which railways from London could be made only with some difficulty. The easiest routes from London to Scotland, therefore, avoid these high moorlands and keep to the lower land, on one side or the other. The easier of the two main routes is that on the east.

The London and North Eastern Railway begins at King's Cross Station in London, and runs northwards. It passes through the Chiltern Hills by a gap at Hitchin, and crosses a fairly level agricultural region through Peterborough to Doncaster and York. It touches few busy manufacturing areas, but is connected, by branch lines, with the West Riding of Yorkshire (coal and wool) and with the ports of Goole and Hull on the Humber.

From the old cathedral town of York the main line continues



[Aerofilms

The railway bridge across the Firth of Tay.

northwards through the Northumberland and Durham coalfield to Berwick. On the way it passes through Newcastle-on-Tyne, an important port, not only for the export of coal, but also for passengers bound for Scandinavia.

In Scotland the line keeps near to the coast, as it makes its way toward Edinburgh, the capital, because of the hilly land that fills so much of southern Scotland. Beyond Edinburgh are two wide estuaries, the Firth of Forth and the Firth of Tay, each of which is crossed by a splendid bridge. Northward, farther still, the line runs to Dundee and along the coast to Aberdeen. This route is continued along the coast to Inverness, but there is a shorter route from Edinburgh to Inverness by means of the Highland Railway.

The Highland Railway does not cross the Tay Bridge, but runs to Perth, after which it follows the river Tay right into the

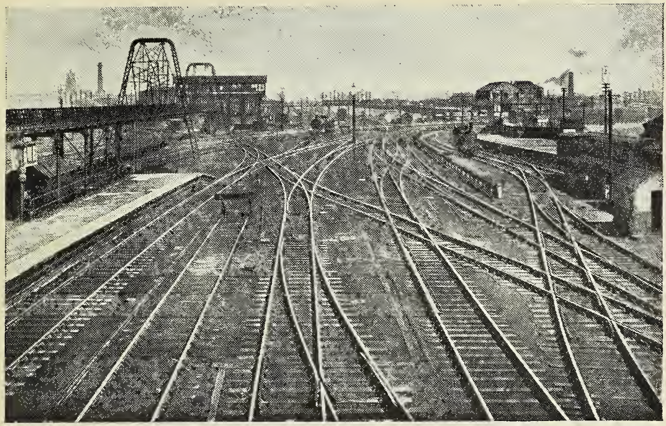
Central Highlands and, by a different but picturesque route, arrives at Inverness.

Beyond Inverness the railway makes use of the lowlands along the coast, and also of a number of river valleys, and finally reaches Wick and Thurso in the far north of Scotland.

The western route to Scotland is that of the London, Midland and Scottish Railway. The line leaves Euston Station in London, crosses the Chiltern Hills by a gap at Berkhamsted, and runs through rolling country to the Black Country, where important branch lines link it to Birmingham, Wolverhampton, and other industrial centres. It passes through the Chester Gap, the wide opening between the Pennines and the Welsh mountains, to Crewe. Another important branch connects it with the Potteries.

Crewe is a very important junction. From it one line goes southwards through Shrewsbury to the Severn valley, one goes across to Birkenhead, opposite Liverpool, and one goes along the north coast of Wales to Holyhead, the port for Ireland. The main line continues through the densely populated cotton manufacturing area of South Lancashire, and then has to climb over Shap Fell that links the Lake District to the Pennines. From here the railway runs steadily downhill to Carlisle.

Carlisle is joined to London by another main line of the London, Midland and Scottish Railway. This leaves St. Pancras Station, crosses the Chilterns by a gap near Luton, and runs through Bedford and Leicester to Nottingham. A branch line leads through beautiful scenery into the Peak District of South Derbyshire, but the main line passes through a densely populated coal-mining region to Leeds. It crosses the Pennines by running up the valley of the Aire, passes through two long tunnels, and descends the valley of the Eden to Carlisle.



[Courtesy, L.M.S.

The important railway junction of Crewe.

Carlisle is another important junction, for, in addition to these two railways, one line reaches it from Workington and Barrow, and another links it to Newcastle through the Tyne Gap.

From Carlisle one line runs westward to Stranraer, a port for Ireland, and several run northwards to the Central Lowlands of Scotland. All of these are difficult routes because they lead through the hilly Southern Uplands. One goes up Liddesdale, across the valley of the Teviot and Tweed to Edinburgh; another goes up Annandale and then runs down the Clyde Valley to Glasgow, and a third runs up Nithsdale, and reaches Glasgow after passing through the Ayrshire coalfield.

From Glasgow a difficult route through wonderful scenery leads northwards to Glenmore, along which the railway runs past Loch Ness to Inverness.

The railways of south-eastern England are naturally very much shorter, and once they are away from London they do not pass through any important manufacturing areas. From Liverpool Street the London and North Eastern Railway serves the agricultural market towns of East Anglia, and by this railway much of the fish that is landed at Lowestoft and Yarmouth is taken to London. An important branch line runs to Harwich, from which port steamers cross the sea to Denmark, Holland, and Belgium.

To the south of the Thames the North Downs is a barrier, but fortunately there are a number of gaps through which the lines of the Southern Railway pass on their way to the fertile farm-lands of Kent and Sussex and the seaside resorts of the sunny South Coast. Many of the trains are now driven by electricity. Express trains also run to Dover, Folkestone, and Newhaven to meet the steamers that sail to and from the ports on the coast of France. By the Southern Railway, too, passengers are taken to Southampton to embark upon Atlantic liners.

The Great Western Railway serves the south-western part of England and South Wales. From Paddington the line runs westwards to Reading. One line then continues westwards up the valley of the Kennet, and thence to Taunton, Exeter, Plymouth, and Penzance. Another follows the Thames into the Vale of Oxford and then runs due westward. It passes through Swindon and passes under the Severn by means of a long tunnel near Bristol and so enters South Wales. It runs through the South Wales coalfield and, keeping mainly to the coastal lowland, reaches Fishguard, another port for Ireland.

The centre of Wales is very mountainous, and although a few railways have been made into the interior, they are difficult routes. Central Ireland, too, is a difficult country in which to build railways, not because it is too mountainous, but because it is too low and boggy.

[Courtesy, L.P.T.B.

A London Underground train in a station.

Just as the railways of England converge on London, so most of the Irish railways run into Dublin, the capital and one of the chief ports. One line of the Great Southern Railway runs from Dublin to Wexford and Rosslare; another runs up the valley of the Liffey and on to Limerick with a branch to Cork; a third goes almost due westward, crosses the Shannon at Carrick, and reaches the west coast at Sligo. The Great Northern Railway goes northwards along the coast until it reaches the boundary of the Irish Free State, when it enters Ulster and continues to Belfast.

London itself is so large that it has a special type of railway, the " Underground " or " Tube." As long ago as 1863 an underground railway was opened on which steam engines were used. The air down below was never very fresh, and on a hot day the smoke and fumes from the burning coal were very unpleasant. In 1890 a deep-level tube was made and electricity tried instead of steam. From that time onwards electricity has replaced steam on underground railways, and more and more " tubes " have been, and are being, built to carry London's millions to and from their daily occupations.

EXERCISES

1. From railway time-tables make a list of the principal towns on each of the main railways of England. Opposite each town state the principal occupation of its inhabitants.

2. On an outline map of England and Wales insert the eight principal railway routes. Insert the chief towns on each route and shade and name the coalfields.

3. Name three important commodities carried by each of the following railways: G.W.R., L.M.S. from Euston, and L.N.E.R. from King's Cross. Name the area where each is produced.

4. What railways would you use to go from London to Bristol, Brighton, Boston, Bolton, Portsmouth, Lowestoft, and Derby?

In each case name the London station from which you would start.

5. Write about five lines to explain what Stevenson, Trevithick, and Hedley each did towards the development of railways.

CHAPTER 5

GREAT RAILWAYS OF THE WORLD

IN each of the continents there are railways much longer than any in England: there is more room for them. Most of them, like the British railways, still use steam engines, but in Switzerland especially, many of the trains are electric. It would be impossible, in this book, to deal with each of the important railway lines in the world; we must be content to look at a few.

Europe

All the countries in Europe are well supplied with railways, and as wagons and carriages belonging to one country are usually able to run over the lines in the other countries, it is not, as a rule, necessary to change from one train to another on long journeys.

There are two important routes across Europe from north to south:

1. At some point on the Channel coast of France, e.g. Calais, Boulogne, Dunkirk, or Dieppe, we can enter a train that will take us across the agricultural lowlands of northern France, right through Paris to the Côte-d'or, in the east. Here the railway passes through a gap and reaches Dijon. It then turns south through the valley of the Saône and the Rhone. On our way we pass through the wine-producing region of Burgundy, the important silkworm-rearing area around the silk-manufacturing town of Lyons, groves of olives, and so to the delta of the Rhone and the port of Marseilles. This route is often used by English people travelling to the Riviera and by passengers whose way lies through the Suez Canal if they do not wish to take the longer journey round Spain and Portugal by sea.

2. The second of our north–south routes runs from the Hook of Holland across the dairy-farming and agricultural lowlands of Holland and North Germany, passes along the western edge of the Ruhr coalfield, the greatest manufacturing region of Germany, and reaches Cologne. We then follow the valley of the Rhine, go through the beautiful Rhine Gorge with its vineyards and castles, and beyond through the wider valley to Basle, where we enter the mountainous country of Switzerland.

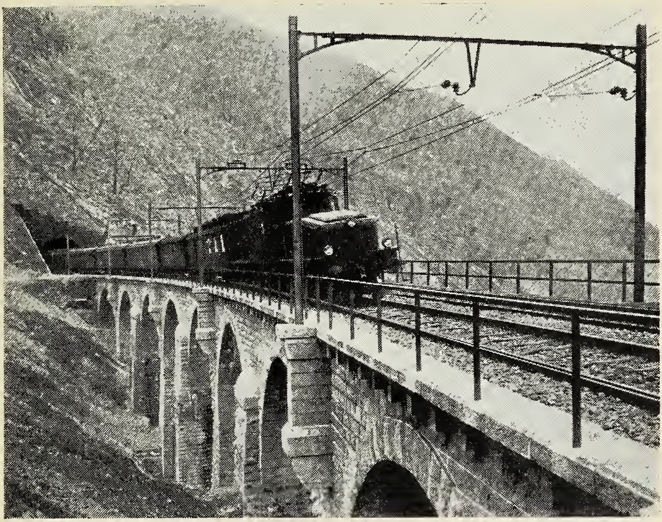
We skirt the beautiful Lake of Lucerne, and go south to cross the mighty Alps. We puff up the valley of the Reuss, and, by a series of wonderful spiral tunnels under the St. Gothard Pass, enter Italy. Our way now lies down the valley of the Ticino, along the shores of Lake Maggiore, across the maize- and mulberry-growing plain of Lombardy, to the great city of Milan. From Milan one line runs down the eastern side of Italy to the port of Brindisi, while a shorter one reaches the sea at Genoa.

Another great railway route, known as the *Orient Express Route*, crosses Europe from north-west to south-east.

We can leave Victoria Station, London, at eleven o'clock on a Saturday morning by the boat train to Dover, cross the Strait of Dover, arrive at Calais, and then step into a railway coach that will carry us all the way to Istanbul (Constantinople). We can have all our meals on the train and sleep in a comfortable bed every night of the journey.

We shall reach Paris at 7.30 p.m. Here some of the coaches on our train will be taken off to be sent elsewhere, while others, also bound for Istanbul, will be added. We, ourselves, do not change.

The next step of our journey takes us eastwards across the agricultural lowlands of northern France to the hilly region of Lorraine, where iron ore is found in large quantities. We pass through a gap in the Vosges Mountains and, early on Sunday



[Ewing Galloway, N.Y.

An electric express train emerging from the St. Gothard Tunnel into Italy.

morning (2.45 a.m.), reach Strasbourg on the Rhine. Here, as at Paris, the make-up of the train changes. Some coaches are removed, and others, that have come from other regions, are added. We sit tight. We steam for a short distance down the Rhine valley, cross the river, go east by a valley to the north of the Black Forest, and then, still eastwards, across the cultivated plateau of Bavaria, through Zurich, to Austria. The railway here follows the river Danube, to pass between the Bohemian Mountains and the Alps. By seven o'clock on Sunday evening we are in Vienna. Here there is more shunting, after which we are taken across a low-lying part of Czechoslovakia and arrive at Budapest at midnight.

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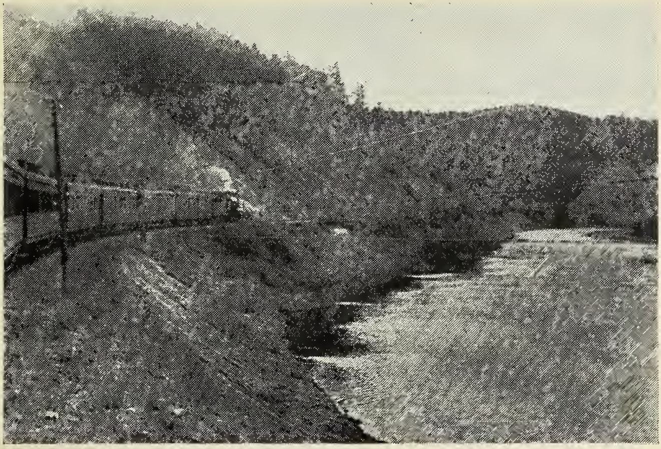
We now steam for nine hours across the low-lying steppelands of Hungary and Yugoslavia, where maize and wheat are extensively grown, and reach Belgrade, a city situated on the Danube some miles before it races through the Iron Gates. Our train then leaves the Danube and follows the narrow valley of the Morava through wild and rugged country. At Nish the railway turns to the south-east, curves and winds amongst the hills, and reaches Sofia, the capital of Bulgaria, about eleven o'clock on Monday night. We steam onwards into the valley of the Maritza, where tons of roses are cultivated to make ounces of scent, to the town of Adrianople. Here the railway leaves the river and cuts across the lowlands of Turkey to Istanbul (Constantinople), which is reached at 3.30 on Tuesday afternoon. When we arrive there we shall find that perhaps all the other coaches except our own that made up the train at Calais have been taken off, while those now with us have been collected from various distant parts of Europe.

Asia

The Trans-Siberian Railway.—The longest railway in Asia is the one that runs from European Russia right across Siberia to Vladivostok, on the coast of the Pacific Ocean. There is not very much trade along this route, and a through train runs only once a week. At ten o'clock every Thursday evening the train leaves Moscow, the capital of Soviet Russia, and begins its ten days' journey across the continent.

Moscow lies in the south of the mixed coniferous and deciduous forest belt. The train runs in a south-easterly direction through the forest, and across the northern edge of the fertile plains known as the Black Earth region. To the south lie the great grain-lands of Russia. The railway crosses the river Volga and rises steadily as it approaches the Ural Mountains, rapidly developing as an iron-mining and iron-working area.



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A train on the Trans-Siberian Railway passing through typical country.

Here also precious metals—gold, silver, and platinum—are mined, and asbestos is worked. By following a tributary of the Volga the railway easily crosses the Urals, and enters the grassy plains of Siberia, where grain growing and dairy farming have developed since the railway opened. For hours the train then puffs across the dreary steppes occupied by nomadic Kirghiz herdsmen tending their flocks. About every three-quarters of a mile along this route there lives a lonely signalman, who waves the train on with a green flag, and every few hours the train pulls up at a wayside station to take in water and a fresh supply of logs with which to feed the furnace.

After crossing the river Ob the railway leaves the steppes and enters the great coniferous forest belt, where trapping for furs is the chief means of obtaining a livelihood. On the seventh day after starting from Moscow we leave the lowlands and the forest, and reach Lake Baikal. This is rimmed round with mountains. At one time, the train was taken across the lake on a ferry in the summer, but ran along rails laid on the ice in the winter. Now, however, the railway runs round the southern edge of the lake, through beautiful mountain scenery to the valley of the river Amur. Here the line follows the river till it reaches Vladivostok, a port that was built to give Russia an outlet to the Pacific Ocean.

Recently a branch line from Semipalatinsk has joined the Trans-Siberian railway to Turkestan, so travellers may branch off from it and reach the cities of Tashkent and Samarkand which are linked to south-eastern European Russia by another railway line.

Africa

Cape to Cairo.—For many years a few men have dreamed of a railway through Africa from south to north. This route, usually spoken of as the Cape to Cairo route, would be very difficult and costly to build, and as motor-lorries and aeroplanes can now deal with most of the transport, it is not very likely that the line will ever be finished. At the present time only the two ends of it are complete.

From Alexandria, the line runs southwards through the fertile lowlands of Egypt to the Sudan. It passes through Cairo and Khartum, and is very useful for carrying the locally grown cotton to the coast.

From Cape Town, in the far south, another line runs northwards. It zigzags up the steep slopes to reach the Karroo, and then mounts still higher on to the veldt. On its way the train passes through scrubby grass-land, where sheep and angora goats are reared for their wool, and the more fertile regions, where the Boer farmers cultivate large crops of maize. It passes through Kimberley, the important diamond-mining centre, crosses the Witwatersrand, the largest goldfield in the world, and runs for about 400 miles through the eastern part of Bechuanaland into the fertile lands of Southern and Northern Rhodesia. Here the line turns westward to link up the country with the river Congo, but there is no railway to join this system with the one through the Sudan and Egypt.

Australia

Each of the states in this great commonwealth has its own system of railways radiating from the principal port, but the gauge, that is, the distance between the lines, is not the same throughout the whole continent, so that it is impossible to run through trains from one state to all the rest.

There is, however, one important trans-continental railway. This starts from Fremantle, the chief port of Western Australia, and runs to Perth, the capital of the state. It then climbs over a pass through the Darling Range, leaves the area of fertility, and runs eastward across the arid plateau. On its way it passes Southern Cross, Coolgardie, and Kalgoorlie, in the important gold-mining region, and then continues eastwards for nearly one thousand miles to the lakes in South Australia. It runs between these to Port Augusta, at the head of the Spencer Gulf, and then on to Adelaide, the capital of South Australia. From here one can continue by train to Melbourne, the capital of Victoria, and to Sydney, the capital of New South Wales.

South America

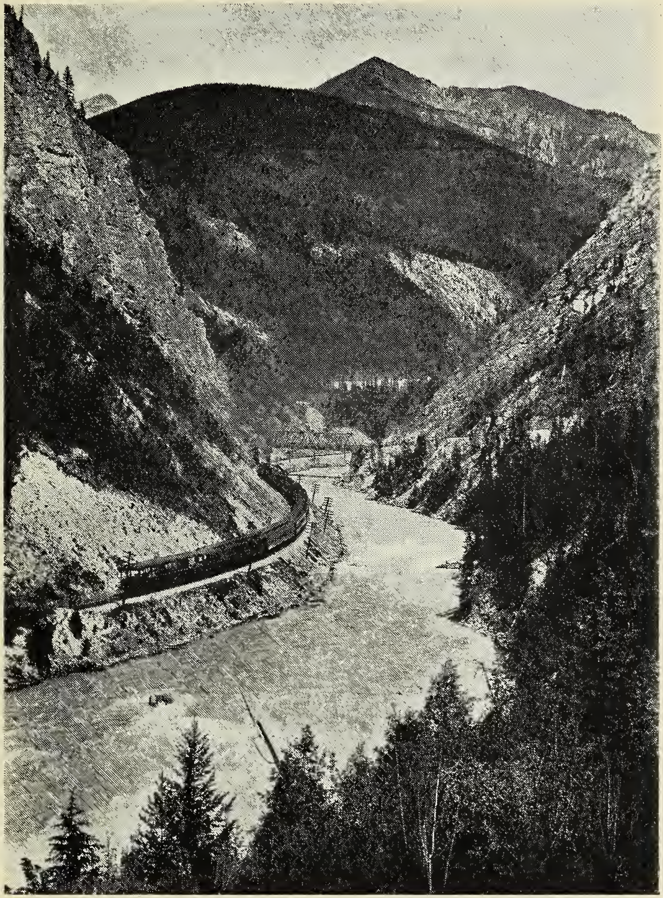
The low-lying plains of the Argentine are well served with railways that convey the maize, wheat, and linseed from the agricultural lands, and the beef, mutton, and wool from the pasture regions to Buenos Aires and the other ports on the shores of the Rio de la Plata. One of these railways used to run westwards from Buenos Aires right across the fertile pampas to the dry foothills of the Andes. It passed through Mendoza, where grapes for wine were grown under irrigation, and then climbed the Uspallata Pass, near the towering peak of Aconcagua, wound its way through the Andes, and descended to Valparaiso, the chief port of Chile.

Unfortunately the Transandine section of the railway from Buenos Aires to Valparaiso has been destroyed by floods. At present the service is : Buenos Aires to Mendoza by rail ; Mendoza to Punta Vacas by motor car ; from Punta Vacas to Valparaiso by rail. The latest information is that the reconstruction of the line between Mendoza and Punta Vacas would be so difficult and costly that it is not likely to be undertaken, at any rate for some years to come.

North America

North America is a land of mighty railways, but here we can deal only with the Canadian Pacific that, like the great cross-country railways of the United States, has done so much to open up the country and bring prosperity to the people.

We will begin our journey across the continent from the important port of Montreal, on the river St. Lawrence. This is the chief port of Canada, and in order to deal with the vast quantities of wheat that are exported, huge elevators are to be seen on the water's edge. Two express trains leave each day to go right across the country: we will take the one leaving at seven o'clock in the evening, and suppose that our journey begins on Sunday. The train runs along the valley of the river Ottawa, and reaches the city of Ottawa, the capital of Canada, in two and a half hours. On the other side of the river are some of the largest saw-mills in the world, for the river flows through an immense lumbering region. For another two hundred miles the train runs up the valley through the forests, and then along the north shore of Lake Nipissing



[Courtesy, C.P.R.

A Canadian Pacific train in Kicking Horse Pass.

and so to Sudbury, in an important copper-, nickel-, and silver-mining area. The line continues to run through the unfertile forest land, skirts the shore of Lake Superior, and reaches Port Arthur and Fort William, two of Canada's great lake ports for transporting wheat to Montreal. The train proceeds through the lake-studded region for another three hundred miles before it reaches the fertile land surrounding Winnipeg. Winnipeg is reached early on Tuesday morning, thirty-six hours after leaving Montreal.

We now enter the great wheat-growing prairies, for which Winnipeg is the chief collecting centre. For about twenty hours we run across these rolling plains to the town of Calgary. Here the railway begins to rise over the Rocky Mountains. It twists round the great mountain peaks, runs along the edge of precipices, and crosses lofty bridges spanning deep chasms. At last it reaches the summit of its route, the Kicking Horse Pass, which it crosses by two spiral tunnels each over half a mile long. We have now gone 2,380 miles, and the time is a little after midday on Wednesday. By taking advantage of river valleys the railway descends to the Fraser River, which is noted for its salmon fisheries, and reaches Vancouver on the Pacific coast at nine o'clock on Thursday morning.

EXERCISES

1. Draw a map of Canada. Insert and name the Great Lakes and the Rocky Mountains. Show the position of the wheat-growing prairies by shading. On the map draw the Canadian Pacific Railway and name the places given in Question 5.

2. Look at a map of Asia showing the Trans-Siberian Railway. Write down the names of three towns, two rivers, one lake, and one mountain range passed on the journey.

3. Make a list of: (1) the names of the countries, (2) the chief towns, (3) the rivers passed on a journey from Paris to Istanbul along the Orient Express route.

4. Name one product carried on each of the following sections of railways:

   (*a*) From Winnipeg to Fort William.
   (*b*) From Johannesburg to Cape Town.
   (*c*) From Cairo to Alexandria.
   (*d*) From Rosario to Buenos Aires.
   (*e*) From Dijon to Paris.

5. The following table gives a number of towns along the Canadian Pacific Railway. In the second column the figures give the miles by rail from Montreal. Those in the third column give the height in feet above sea-level.

Imagine that the railway is straight, and draw a section along the route. (Represent 500 miles along the track by 1 inch, and let $\frac{1}{10}$ inch represent an altitude of 400 feet.)

Between what two stations do you find the greatest slope?

Town	Mileage	Altitude in Feet
Montreal	0	110
Ottawa	110	210
Sudbury	440	860
Fort William	990	620
Winnipeg	1,410	770
Regina	1,770	1,900
Moose Jaw	1,810	1,780
Medicine Hat	2,070	2,410
Calgary	2,250	3,390
Banff	2,330	4,630
Pass through Rockies	2,364	5,680
Vancouver	2,890	14

CHAPTER 6

RIVERS

WE have, in other books of this series, seen something of the use of rivers to man. We have noticed how they drain the land, how their waters are used in some countries for irrigation and in others for making electricity. In this chapter we shall deal with them as routes along which boats and barges can carry goods and passengers. For such purposes they were used long before men knew how to build roads and centuries before men ever dreamed of railways. Traces of early trade along the European rivers are widespread.

It was by means of the rivers that the Norsemen of old made their way into the inland parts of England, at first to plunder the countryside, but later to settle down in peace. The English rivers, however, are rather short, and, in these days, it is only their estuaries that are of any real importance for purposes of transport. To see how useful rivers can be as roads, we shall have to go to some other parts of the world.

South America

The largest river in South America, the longest, in fact, in the whole world, is the river Amazon. This river, as we saw in Book I, flows through an immense plain covered with dense forests and swamps. It would be difficult and costly to make either roads or railways through such a land, and the Amazon and its tributaries are the only highways of travel in central Brazil. Ocean-going steamers can enter the port of Belem and sail nine hundred miles to the river port of Manaos, or even two thousand miles to Iquitos in Peru, while smaller vessels can go right to the foot of the Andes.

Some of the tributaries of the Amazon, such as the Madeira

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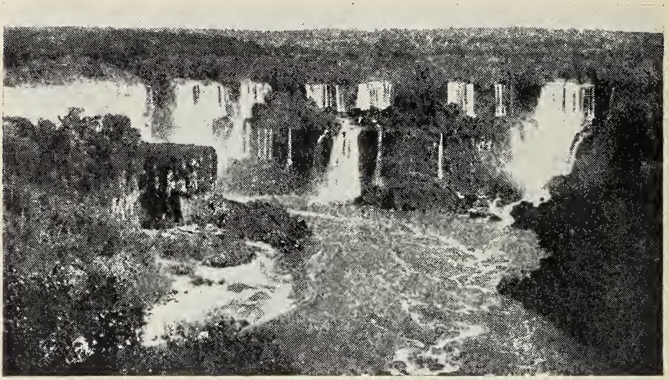
A boat on the river Amazon. [E.N.A.

and the Negro, are themselves immense rivers. Altogether there are in this equatorial forest-land about thirty thousand miles of navigable rivers, a distance greater than the circumference of the earth. At one time these waterways were very useful for transporting the wild rubber that was collected by the Indians. Then Manaos, at the junction of the Negro and the Amazon, was a great rubber-collecting centre, and Belem was the port from which the rubber was exported. Nowadays wild rubber is not collected very much, and the chief products coming down these rivers are cocoa, Brazil nuts, and vanilla.

Farther south, in South America, there is another system of



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The Iguazu Falls, on a tributary of the Parana river.

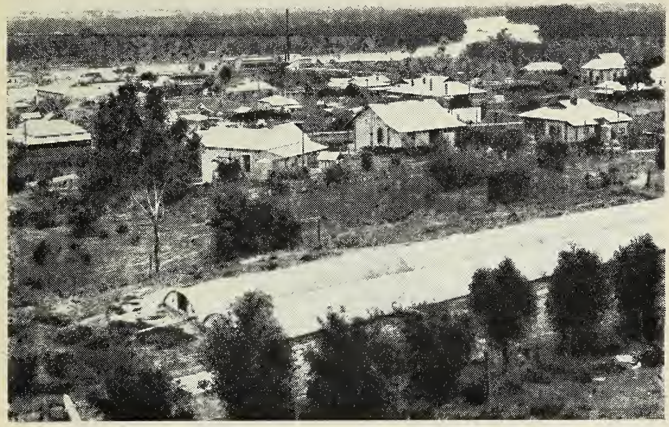
navigable waterways formed by the rivers Parana, Paraguay, and Uruguay, which flow into the river Plate. The Parana rises so near to one of the tributaries of the Amazon that it is possible in a wet season to go from one river to the other in a canoe. Along the river Plate there are the important seaports of Buenos Aires and Montevideo, but ocean steamers can pass beyond the town of Rosario, while smaller boats can go hundreds of miles farther up the Paraguay.

Along the upper Parana there are stretches of rapids, and on one of its tributaries there are the Iguazu Falls, one of the largest waterfalls in the world.

Argentina is well supplied with railways, but, in spite of this, some of its chilled beef, corned beef, maize, and maté tea are sent down the waterways to the Plate ports for export.

Australia

In Australia, though there are many rivers, there are no great waterways leading into the interior of the continent. On a map



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The town of Berri on the banks of the river Murray.

the Murray, Murrumbidgee, Lachlan, and Darling, which flow across the lowlands of the south-east, seem to offer a splendid system of river routes, but they are shallow and, in times of severe drought, may cease to flow. After a rainy season, however, they are navigable by steamers, and are then used for carrying wool and wheat to certain river ports, whence the cargoes are taken to the coast by railway.

Africa

Here, again, the rivers are not so useful as the map suggests, though the natives have long used parts of the Congo, the Niger, and the Nile as highways, and most of their villages are within reach of the streams. Much of Africa is a high plateau across which the rivers have cut rather deep valleys. Where they leave the high land to enter the coastal plains, there are usually waterfalls or rapids which prevent ocean steamers from making their way inland.

The Congo, like the Amazon, flows through an equatorial forest-land, but it is far less useful as a means of entry into the country. Near its mouth there are a number of cataracts, and ocean steamers can only proceed as far as Boma, sixty miles from the sea. Above the falls, however, the river is a great highway, and river steamers can sail along it for a thousand miles until another interruption, the Stanley Falls, is met with. Goods coming down the Congo have here to be unloaded from the river craft and loaded again into trains, which carry them for two hundred and fifty miles to Boma.

Farther south is the Orange River, which is practically useless for navigation. It has a shallow bar across the mouth, so that ocean steamers cannot enter; it flows through a deep valley, so that the water is difficult to reach, and it has rapids along its course. At one point it plunges over the Great Falls, which are more than twice as high as the Falls of Niagara.

Between these two river basins the land is drained by the Zambesi, which is also obstructed by rapids, but there are stretches of water between the rapids that are useful for navigation. About one thousand miles from the coast, however, the Zambesi hurtles over the Victoria Falls, where the whole mass of water plunges over a cliff into a gorge four hundred and fifty feet below. British engineers have just constructed a great bridge over the Zambesi, which will help railway and road traffic.

In the north of Africa the Nile and the Niger are both useful for navigation, but both have deltas at their mouths which are hindrances to shipping, and both are obstructed by rapids. Along the Nile there are six sets of these racing torrents, known as the six cataracts, and although ships sail up and down the quiet water between them, and carry cotton, wheat, and other

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The rapids at Assouan near the first cataract on the Nile.

agricultural produce, it is impossible for them to transport the goods past the rapids to the coast. Egypt lies to the north of the last cataract, and here steamers ply up and down, but the streams through the delta are too shallow to allow ocean steamers to enter. The Nile is of much greater use for irrigation than it is for navigation.

The Niger rises near the Atlantic coast, flows to the edge of the Sahara Desert, and then turns to the south-east and enters the Gulf of Guinea. Like the other African rivers, it is obstructed by rapids, but river steamers can travel up it for five hundred miles to Rabba, and also up its main tributary, the Benue, for another six hundred miles. As the Niger flows through a region where rain seldom falls, the middle part of the course is usually shallow. After the summer rains, however, it fills up and is useful for navigation, above the rapids. It then rises so high and floods so much land that the negroes near Timbuctoo, who grow rice on the lowlands during the dry season, catch fish in the water that covers them after the rains have fallen.

North America

Unlike Africa and Australia, North America is a continent of large and navigable waterways. The largest of these is the Mississippi, which, with its main tributaries, the Missouri, Ohio, and Arkansas, drains the central plains of the United States. Even these waterways, however, have their disadvantages for transport; in places mudbanks have formed, so that the water is very shallow, and the rivers twist about so much that the journey by water is much longer than that by land. Before railways were made, these rivers were of great importance in carrying the wheat of the north, the maize of the centre, and the cotton of the south, to New Orleans for export, and the system is still of much use as a highway. Flat-bottomed steamers are continually passing up and down with passengers and cargo. These vessels are especially built for shallow water; one American humorist has said that they could sail across a meadow on the morning dew.

Farther north are the Five Great Lakes of North America. These are of immense importance in transporting iron ore and grain. The iron ore is mined in large quantities around the shores of Lake Superior, and is sent eastwards to the smelting towns on Lake Erie and to Pittsburg. Much of the wheat from the prairies and the maize from the cornbelt is shipped from ports on the shores of Lake Superior and Michigan towards the seaports on the east coast. The steamers that carry these cargoes are called *whalebacks*: some of them are over two hundred yards in length.

There are two hindrances to navigation along this important route: frost and waterfalls. The winters, in this part of the

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A whaleback leaving one of the Soo Canal locks.

world, are so cold that the lakes and rivers freeze and transport along them ceases for about five months each year.

The waterfalls and rapids are caused by the fact that the lakes lie at different levels. Lake Superior, for instance, is at a higher level than Lake Huron. Between them are the St. Mary Rapids. These, at one time, formed a barrier. Now, five separate canals, with a number of locks, allow vessels to pass. The Soo Canals, as they are called, are so important that, during the seven months of the year when the lakes are open, the ships making use of them carry about five times as much cargo as those passing through the Suez Canal in a whole year.

Lake Erie, again, is much higher than Lake Ontario.

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Steamers held up by the ice in the Soo Canals.

Between them are the mighty Niagara Falls, which can be avoided by the Welland Canal. Some of the cargo boats do not pass through the Welland Canal; they leave the lake at Buffalo by the Erie Canal and go to New York. The others proceed along the river St. Lawrence to Montreal, where most of their cargo is transferred to ocean-going vessels.

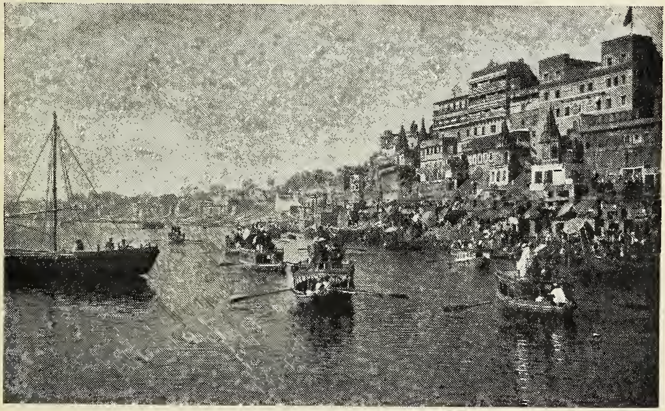
In the far north there are two other great rivers, the Mackenzie and the Yukon. The Mackenzie, unfortunately, leads out to the Arctic Ocean, and hence is not so useful as it would be if it flowed either to the Atlantic or the Pacific.

The Yukon, in Alaska and north-west Canada, offers a highway for travel and transport in the Yukon plateau. It flows, unfortunately, into the cold Bering Sea, and its mouth is blocked with ice for nine months of the year. During the winter its frozen surface is used like a land road, over which teams of dogs carry letters and small parcels.

Asia

Asia possesses quite a large number of important rivers. Some of the largest flow to the north through the coniferous forest and the tundra, where there are few people, and so out to the Arctic Ocean. They are of little use for trade. Those flowing into the Indian Ocean are of greater value. The Indus, however, is not so valuable as it looks on the map, because it is too shallow and its current is too fast.

The Ganges and some of its tributaries are good waterways. Laden barges can go as far as Cawnpore, and much cotton, rice, and jute grown in the Ganges basin is carried, in this way, to Calcutta. There is also a regular steamer service from the mouth of the Brahmaputra to the north-east of India.



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Boats on the river Ganges.

The Ganges is, however, like the Indus, of more importance for irrigation than for navigation.

China is well supplied with navigable rivers, the most important of which is the Yang-tse-kiang, which connects an inland fertile farming region with the sea. Ocean steamers can reach Hankow, where the river is fifty feet deep and nearly two miles wide. Above Ichang there is a gorge through which the Yang-tse-kiang races at great speed. Through this gorge Chinese junks are hauled by teams of one or two hundred men, after which they can go on to Chung King, about fifteen hundred miles from the mouth. The journey, however, can now be made by steamer. The Chinese are great cultivators and great boatmen, and by means of their junks they convey much silk, tea, rice, and cotton to the market towns and to the port of Shanghai to be exported to foreign countries.

Europe

In Europe there are a great many important navigable rivers. The chief of these are the Rhone, Seine, Rhine, Elbe, Oder, Vistula, Danube, Dnieper, Po, and Volga. Some of them are connected to each other by canals, and all carry a great deal of traffic, even where there are many railways. On their banks stand some of the largest cities in Europe, for the cities were built at a time when the rivers were often the chief roads.

The longest river in Europe is the slow-flowing Volga, which drains practically the whole of European Russia, but, in its lower course, it flows through a region that is not very important, and it empties into the Caspian Sea, that has no outlet to the ocean. Moreover, it is frozen in winter.

The Rhine, which has been called " the High Street of Europe," offers a splendid highway into the centre of the continent. It rises in the Swiss Alps, and is too fast to be

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The river Danube at the gorge known as the Iron Gates.

of any use to boats until it reaches Basle. At Basle, it turns to the north, and its speed begins to slacken, though the current is still swift. Farther north it becomes a great traffic route laden with steamers and barges. Some of the barges are as much as eighty yards long, and as many as five or six of them may be towed along by a tug that is as big as one of the small steamers that sail round the British coast.

Small ocean-going steamers are met with at Cologne. A little north of Cologne are the important industrial towns of Düsseldorf and Duisburg, from which coal is sent up and down the river from the great coalfields in the valley of the Ruhr, a tributary of the Rhine.

At the mouth of the Rhine, in Holland, is Rotterdam, the chief port for the traffic of the Rhine.

The Danube rises in the Black Forest, not far from the Rhine, and flows for about four hundred miles across the plateau of Bavaria. Even here it is navigable for barges, but river steamers do not proceed above Passau, where it is joined by the river Inn. It then passes through Vienna, the capital of Austria, Pressburg, a Czechoslovakian town, to Budapest, the capital of Hungary. All these towns are important river ports. It then meanders across the lowlands of Hungary and Yugoslavia to Belgrade. Throughout the steppe-lands there are few good roads or railways, and the river is a very important means of transporting the grain crops to the coast. Shortly after passing Belgrade it races through a gorge, known as the Iron Gates, which at one time was a barrier to navigation, but the river bed has been deepened, and a short canal has been made so that steamers and barges can now go through the gorge without much danger. The Danube then flows through the grain-growing lands of Rumania to its delta in the Black Sea. At the mouth of one of the delta streams stands the small but important port of Sulina, which deals with the bulk of the grain brought down by the river steamers.

The Danube has three disadvantages for shipping: (1) in winter the lower course is covered with several feet of ice, so that navigation is held up altogether, (2) the streams through the delta are not deep enough for large steamers to enter the river, and (3) it flows into the Black Sea, which is far away from the important parts of Europe.

EXERCISES

1. Make a list of the following rivers, and opposite each write the names of two towns on its banks and a seaport at or near its mouth: Nile, Ganges, Parana, Mississippi, and Rhine.

2. Draw maps of some of the great rivers mentioned in this chapter. Shade the highlands, and insert and name the chief tributaries and towns.

3. What are the principal disadvantages for navigation of the following rivers: St. Lawrence, Mississippi, Murray, and Danube?

4. Write down about five conditions that a river must fulfil in order that it should be a first-class waterway for trade.

5. Name some of the principal commodities carried by boats on the Yang-tse-kiang, the Danube, the Great Lakes of North America, and the Rhine between Düsseldorf and the sea.

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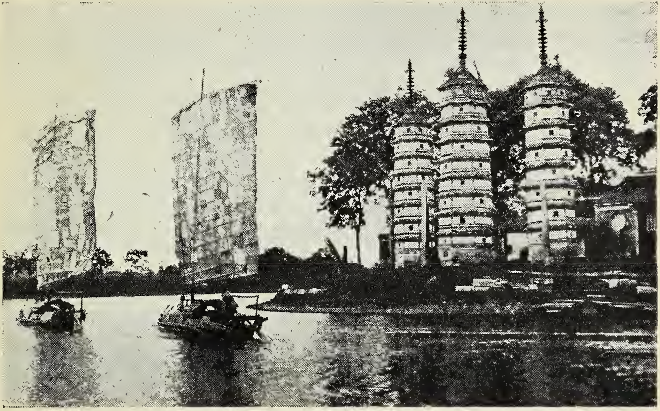

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Native boats on the Grand Canal in China.

CHAPTER 7

CANALS

CANALS, or artificial waterways, have been made in different parts of the world for a number of different reasons. In China, where the lowland plains are crossed by a network of canals that connect thousands of towns and villages with each other and with the river, they are made chiefly for *irrigation* in order to lead water from the rivers to the rice-fields. It is said that there are nearly two hundred thousand miles of such canals in China.

In Holland the canals are made, not to put water on the land, but for *drainage*. Their purpose is to carry water from the land into the rivers and out to sea. In both China and Holland they are also used for *transport*. There is probably no region in the world where so much freight is carried on canals as in

China. The largest of the Chinese canals is the Grand Canal, nearly one thousand miles long, which runs from north to south, and was built to transport rice from the south to the old capital of Peking (Peiping). Though parts of it are now in ruins, much of it still forms an important highway.

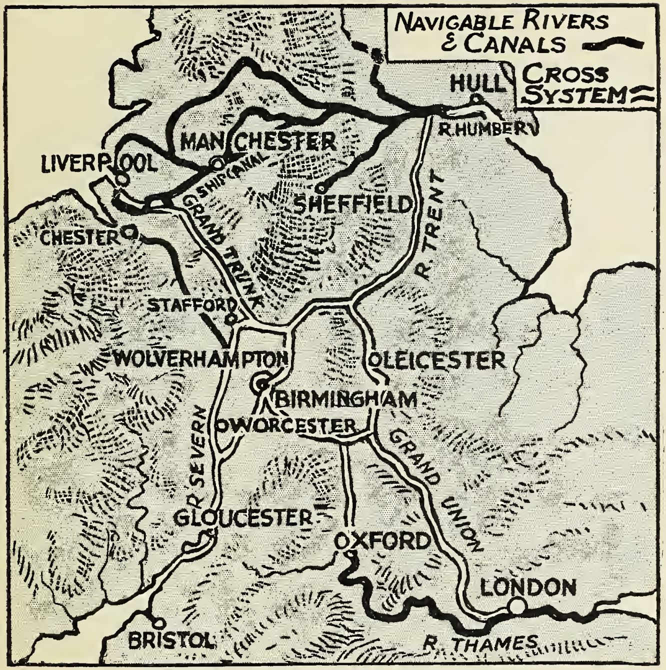
The making of canals began a long while ago. Six hundred years before the birth of Christ, King Nebuchadnezzar built a canal in Mesopotamia so long that it stretched as far as from London to Edinburgh. About the same time a canal was made in Egypt to join the river Nile to the Red Sea

The Romans, when they were in England, made two canals, parts of which can still be seen. One of these, the Carr Dyke, about fifty miles long and fifty feet wide, ran from Lincoln through Peterborough to Cambridge. Its purpose was to prevent rain-water flowing down from the high land and flooding the lowlands of Lincolnshire. It carried the flood waters to the rivers Witham, Nen, and Cam.

The Carr Dyke was for drainage. The other Roman canal, the Foss Dyke, was for transport. It was only about ten miles long, but it linked the Trent with the Witham, and enabled goods to be sent from the centre of England to the little seaports on the Humber. It is still in use.

The canals of England (see map) are arranged on a quite different plan from that of the railways. The chief railways run to London: the centre of the canal system is Birmingham. From Birmingham barges can go : (1) into the Trent and so to Hull and the Humber, (2) to Liverpool, (3) to Worcester and down the Severn to the Bristol Channel, and (4) to London.

All these canals and many others were made about one hundred and fifty years ago, when English roads were bad, and travelling was dangerous. At that time the canals were used, not only for transporting heavy goods about the country, but also for carrying passengers, the barges being fitted with fairly



Map of Central England showing the canal system.

comfortable seats, awnings to keep off the rain and the sun, and a buffet to supply the passengers with meals. Travelling by canal was slow, but much more comfortable and faster than travelling by road. At the beginning of last century a company of soldiers that had to go in a hurry from London to Liverpool went by canal and took a week to make the journey !

It is not difficult to build a canal in level country. The trouble comes when the ground is hilly. In order to carry a canal over hilly ground, locks must be made. A lock is a kind of big box with solid gates at either end. When a barge or other vessel approaches, the gates at one end are opened and the vessel passes into the box. The gates are then closed, and the water in the lock is allowed to rise or fall till it reaches the level of the water on the far side. The second gates are then opened and the vessel goes on its way.

For a little while canals provided the best means of transport, especially for heavy goods, but with the coming of the railways the carrying trade along the canals grew less and less. Many of them fell into disuse, and only a few, chiefly in the Midlands, continue to prosper by carrying such materials as coal, iron ore, cement, bricks, building stone, and china clay.

The families that travel with the barges frequently have no other home than the barge. In a way they are nomads; they are always on the move. In the small cabins in the stern of the boat the bargees cook their food, eat their meals, and go to sleep. Every evening the barge is moored to the side of the canal, the horse is given its well-earned rest, one of the family goes to the nearest village to buy food for the following day, and then all go to bed until it is time to move off next morning.

Life on the canal barges is, however, changing rapidly. Motor-boats are being used which may bring some transport back to the canals, for they can travel swiftly and the cost will be less than by road or rail.

On the continent of Europe there are a great many canals built, like those of Britain, to connect the rivers. Inland barges can go from the Baltic Sea to the North Sea by means of canals that link the Oder and Elbe. It is also possible to go by water from Rouen on the Seine in France across to Poland, from the Rhine to the Danube or the Rhone, and from the Rhone to the Seine. The canals of Europe are wider and deeper than those of Britain, and their locks are much longer.

[Photopress.

A barge passing through locks on the Grand Junction Canal.

So far we have been speaking of shallow canals that link rivers, and are used merely for barges and small boats. Others, known as ship canals, are wide enough and deep enough to take ocean-going vessels.

Some of the ship canals have been made to allow vessels to pass rapids and waterfalls on rivers. We have already mentioned the Welland Canal that connects Lakes Erie and Ontario, between which are the Niagara Falls. Ships using this canal rise or fall more than 100 yards by means of eight locks. Those that carry grain are of immense size. To take them the canals have to be deep and the locks have to be large. One of the locks, the largest in the world, is over a quarter of a mile from end to end.

The Welland Canal is itself sufficiently large for ocean steamers, but unfortunately, at present, such steamers cannot pass along the St. Lawrence between Montreal and Lake

Ontario. When this part of the St. Lawrence is deepened, grain ships will be able to travel to Liverpool right from the western shores of Lake Superior.

Some of the ship canals have been made to allow ocean-going vessels to reach an inland city. The largest of these in Britain is the Manchester Ship Canal. This canal runs from the mouth of the river Mersey to Manchester, and so allows steamers to reach the industrial part of Lancashire. It was built with much difficulty, partly because there were a number of old routes that crossed the line of the canal, and these routes had to be altered. Four railways had to mount slopes, each a mile long, to be carried over bridges high enough to allow a ship's masts to pass underneath; swing bridges had to be made to carry the old roads, and, more wonderful still, a big lift had to be constructed to raise a section of an old shallow canal, the Bridgewater Canal, whenever a steamer needed to pass along the Ship Canal.

It should also be remembered that the Clyde has been so deepened and walled, that it is now practically a ship canal connecting Glasgow with the sea.

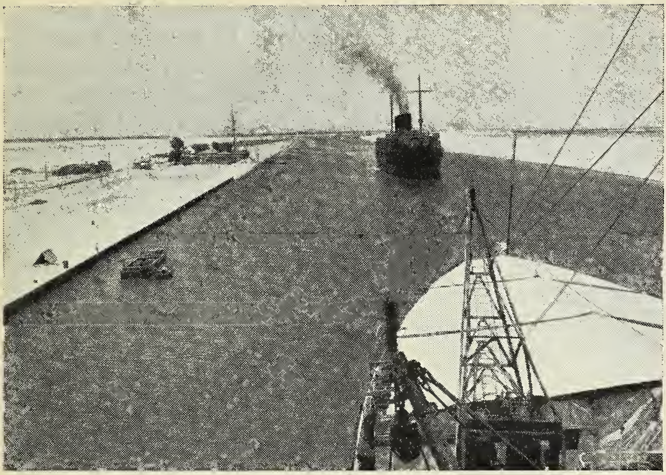
The two most important ship canals are the Suez and the Panama.

The Suez Canal was cut in 1869, through the isthmus, or narrow neck of land, that joins Asia to Africa. Before it was made some of the routes between Asia and Europe or Africa were partly by land and partly by water, and they carried what, in these days, we should think very little traffic. Three such routes were:

(*a*) By the Black Sea, Sea of Azov, the river Don, overland north of the Caspian Sea, and so to China.

(*b*) From Damascus in Syria to the Persian Gulf and the Indian Ocean.

(*c*) By sea to Alexandria and then by river barges up the



[Ewing Galloway, N.Y.

A ship steaming through the Suez Canal.

Nile to Cairo. From Cairo passengers were taken by donkey coach to the seaport of Suez on the Red Sea, while several thousand camels might be required to carry the ship's cargo. From Suez to India and the Far East the journey was by sea.

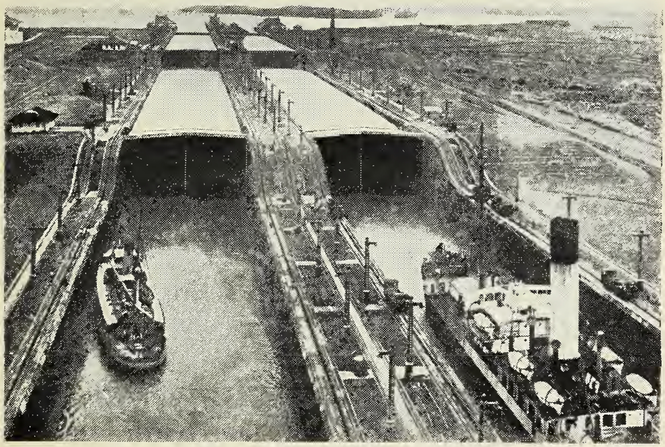
After the discovery of the seaway to India there was, of course, an all-water journey round the Cape of Good Hope.

The Suez Canal is one hundred miles long and about seventy yards wide, and shortens the sea route to India by over five thousand miles. It has been deepened from time to time, and now has thirty-two feet of water, but even this is hardly deep enough. When, for instance, the *Empress of Britain* goes through the canal, there are only a few inches to spare.

The Suez Canal begins at Port Said, a town built on a desolate stretch of sand. Here there are concrete breakwaters running far out into the Mediterranean: the western one, built to keep off silt brought down by the Nile, is nearly three and a half miles long. The steamer passes between these breakwaters, first into an enclosed harbour and then into the canal. The canal was made through a number of depressions which are now flooded to form lakes, the largest of which are known as the Bitter Lakes. Elsewhere it crosses a barren, lifeless desert of yellow sand. The canal is not everywhere wide enough for liners in motion to pass each other in safety. To enable them to do so it is widened, for a few hundred yards, every four or five miles and, to avoid collisions, the ships are signalled through like trains on a railway. The journey from Port Said to Suez takes about sixteen hours, and to avoid ships anchoring for the night, strong arc lamps have been erected along the whole length of the canal, and even across the lakes.

Another important ship canal is the Panama, that joins the Atlantic and Pacific Oceans through Central America. The Suez Canal was made through fairly level land, and the work was comparatively easy. The making of the Panama Canal, on the other hand, was a long battle against difficulties: the land was hilly, the climate was hot and oppressive for the workmen, and the air swarmed with fever-carrying mosquitoes. The difficulties were so overwhelming that the first two attempts made by the French failed. The work was completed by the United States a fortnight after the outbreak of the Great War in 1914.

The Canal really begins well out in the Atlantic, for the bay at Colon is shallow, and a deep channel had to be dredged across it. Then for seven miles the canal goes across fairly level land to Gatun. Here there used to be a river flowing down from the hills, but a mighty dam, 105 feet high, was built across it so that the upper part of the valley was converted into a high, level lake twenty-two miles long. The



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The Gatun locks on the Panama Canal.

lake forms a part of the waterway, and is reached by a double series of locks—one series for up-going traffic and one for down. These locks are very different from those on British canals. They are three hundred yards long and each gate weighs about five hundred tons. They are opened and closed by electrical machinery, and the ships are hauled in by electric engines, the electricity being made by the surplus water as it flows over the dam.

At the far end of the great artificial lake the canal passes through a nine-mile gorge cut by the canal builders through a range of hills—a wonderful piece of engineering. Then the ship is lowered down through three more locks to the level of the Pacific, which it enters at the town of Panama.

This canal has shortened the sea voyage from New York to San Francisco by 9,400 miles, brought New York 3,600 miles nearer to Australia by boat, and Liverpool 4,000 miles nearer to Yokohama. But many ships still use the longer routes because they are cheaper. It costs a lot of money to make a ship canal and keep it in repair, and all vessels passing along it must pay a toll. These tolls are very high. H.M.S. *Hood* not long ago paid £4,400 for a single journey through the Panama Canal.

EXERCISES

1. Find out all you can about James Brindley, the builder of the Bridgewater Canal, and Vicomte Ferdinand de Lesseps, the promoter of the Suez Canal.

2. Look at a map of the world. What sea was made into an important highway by the opening of the Suez Canal? Name three ports which benefited greatly when this route was opened.

3. A large number of men were employed to dig our navigation canals. Why is a workman who digs called a navvy?

4. What is meant by saying that Liverpool is now four thousand miles nearer to Japan than it was in 1900?

5. The following table gives some of the most important ship canals:

	Length in Miles
Suez	100
Panama	50
Kiel	61
North Sea (Amsterdam)	16
Welland	25
Soo	1
Manchester	35½

Mark these on a map of the world. More cargo passes through the Soo Canal than through any other. What is this cargo? Through which canal do you think most passengers pass? Give your reasons.

6. Consider the following:

(*a*) Every day an ice-cream manufacturer has to deliver supplies to five hundred shops within twenty miles of the factory.

(*b*) A colliery in the West Riding of Yorkshire has to send ten thousand tons of coal to Goole to be exported.

(*c*) From a factory in the Black Country one hundred bicycles have to be sent to London.

The ice-cream factory, the colliery, and the cycle works are all alongside roads, railways, and canals. Which means of transport is best in each case? Give your reasons.

7. Hold a discussion in the class upon the best method of transport for various types of goods. Consider as many different points as you can.

CHAPTER 8

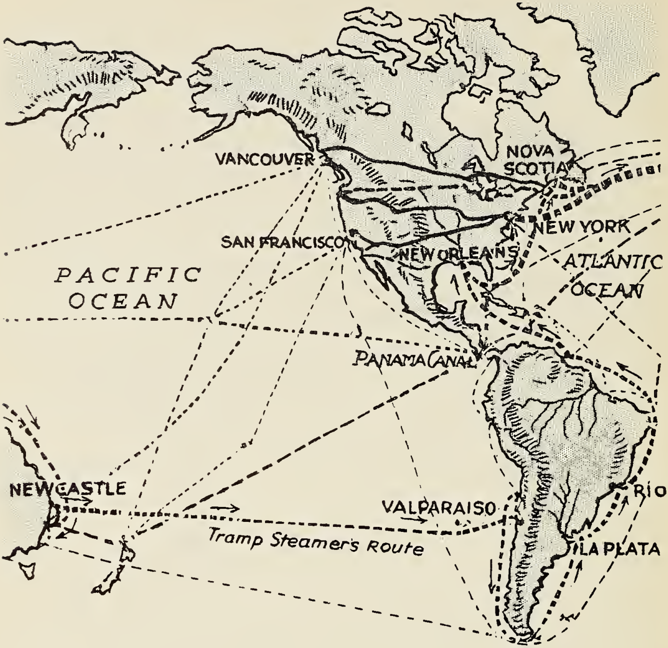
OCEAN TRANSPORT

ROADS and railways, rivers and canals, carry goods and passengers from one part of a country or a continent to another. The great highways of travel, however, are the oceans. The ships that cross the oceans and link the continents with each other are of different kinds. Just as there are, on a railway, express trains for carrying passengers and slower ones for goods, so, on the sea, there are express liners and slower tramp steamers. And, just as mail bags and some kinds of merchandise are carried by passenger trains on railways, so, on the sea, some kinds of cargo are carried in passenger liners.

A liner keeps to a fixed route and calls at the same ports on every voyage and, like an express train, runs to a definite timetable. A tramp steamer, on the other hand, moves something like a furniture van: it goes wherever there are goods to be carried.

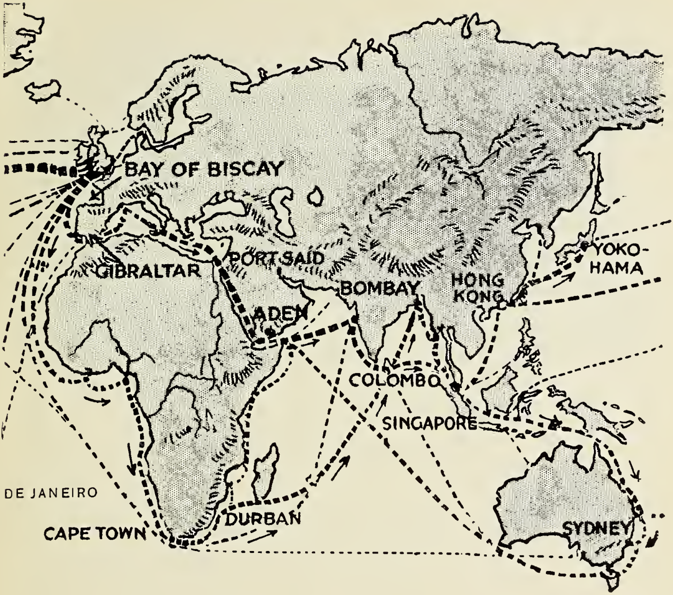
If you could see the whole of the ships of the world at once and watch them ploughing across the oceans you would notice that most of them are on their way to or from Western Europe. This area is the chief terminus of the world's shipping and the most important centre in the area is Great Britain.

We should see ships coming to British ports across the Atlantic from Canada and the United States of America (Cunard-White Star Line), from New Zealand, via the Panama Canal (New Zealand Line), from Jamaica and the West Indies (Fyffes Line and Jamaica Direct Fruit Line), and from Brazil and the Argentine (Royal Mail Line and Blue Star Line). Along the west coast of Africa liners keep us in touch with the Guinea Coast (Elder Dempster Line) and South Africa (Union Castle Line). From the Suez Canal and the Mediterranean



Sea ships reach us from the Far East and India (Peninsular and Oriental, Ellerman's City and Hall Lines), from Australia (Orient Line and P. & O.), and from the East Coast of Africa (Union Castle Line).

These liners vary greatly in their size and speed, and in the comfort that they offer to passengers. The finest, in every way, are those that run across the Atlantic to the United States of America. Western Europe and the United States are both great trading regions. Thousands of business men and



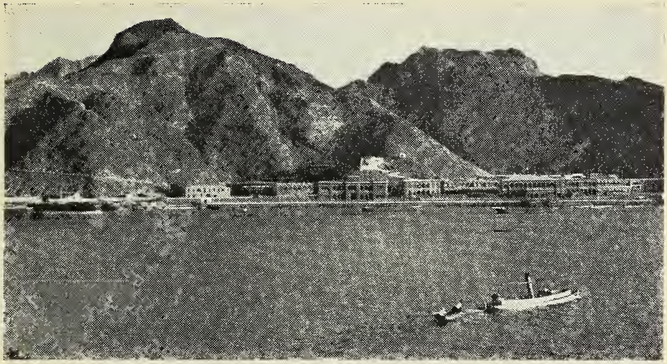
Map showing the principal shipping routes of the world. The dotted lines vary in thickness according to the amount of traffic which uses the route.

tourists cross from one continent to the other, so that the ships must be large; business men and mail bags are always in a hurry, so that the voyage must be made as quickly as possible, and as the wealthy passengers live comfortably at home they expect similar comfort even on the sea. It would not pay to run such magnificent ships on any other trade route.

These floating hotels can each carry about four thousand people, and they are so splendidly fitted that all the passengers can have comfortable bedrooms, excellent meals, and plenty of recreation. On the *Queen Mary* there are eleven separate decks with twenty-one lifts to take passengers from one to another. There are a shopping centre, gymnasium, swimming pool, baths, a children's play room, immense dining saloons, a lounge in which fifteen double-decked buses could be garaged, and a cinema.

The first steamship of the Cunard Line took about a fortnight to cross the Atlantic. Now a passenger can leave Southampton and within five days can walk down the gangway on to the quay at New York. On this route there are no ports of call; the liners just run to and fro across the Atlantic like ferries.

Now let us follow a P. & O. (Peninsular and Oriental) liner that puts in at several ports on its six weeks' voyage to the Far East. We will imagine that it is winter time. The liner takes in coal, water, provisions, and light cargo while she is lying in one of the enclosed basins of the London Docks. Then she steams downstream, and takes on passengers and mail bags at Tilbury. When all is ready we sail down the Thames, round the coast of Kent and Sussex to Southampton, where more passengers embark. We may expect cold weather and rough seas for the next few days while we are going along the English Channel and across the Bay of Biscay. The saloons and cabins, however, are kept warm by radiators. On the third day out we pass along the coast of Portugal and see numbers of small ships engaged in catching sardines. Then we turn eastwards, and see before us the mountain headland known as the Rock of Gibraltar. We drop anchor in the Strait of Gibraltar, and a lighter takes ashore any passengers who wish to disembark. After about an hour the anchor is weighed and we continue our way across the sunny Mediterranean Sea. We steam along the coast of Spain, past the Balearic Islands to the important French port of Marseilles. Here many more



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The Port of Aden at the southern end of the Red Sea.

British passengers and mail bags are waiting. They left England after the ship sailed, and have taken the quicker railway journey across France. For the following four days we put in at no more ports. We pass between the islands of Corsica and Sardinia, through the Strait of Messina between Italy and Sicily, and across the Eastern Mediterranean south of Crete, to Port Said. Here we begin the sixteen hours' passage through the Suez Canal. The weather is now quite hot. The radiators have all been turned off, and electric fans are switched on.

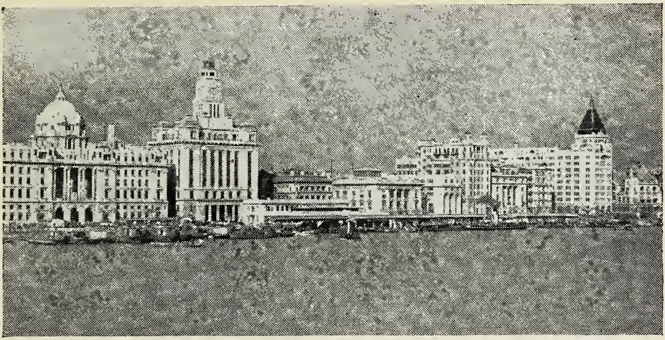
From Suez the steamer ploughs its way through the Red Sea, and calls at Aden, in the south of the Arabian peninsula. Here, perhaps, a party of British soldiers disembarks, for Aden is an important garrison town. Then we cut across the Arabian Sea, and, four days later, reach Bombay, in India. The liner now steams along the Malabar Coast and reaches Colombo, in Ceylon. Colombo is an important seaport, not merely because it exports large quantities of tea, rubber, and copra, but

The harbour at Singapore. [E.N.A.

because it lies at the junction of several important trade routes. Ships from Calcutta, the Far East, Australia, and South Africa call at this port and exchange cargoes.

From Colombo our liner sails due eastward, across the Indian Ocean to the straits of Malacca between Sumatra and Malaya, and then on to Singapore. Here we can see other steamers taking on board cargoes of rubber, tin, and copra. We now enter the Pacific Ocean and sail to Hong Kong, a British port in the south of China. Four days later we reach Shanghai, the port near the mouth of the Yang-tse-kiang. The East China Sea is then crossed and the liner makes for Japan. It puts in at the picturesque harbour of Kobe, and two days later reaches Yokohama, lying near Tokio, the capital of the country.

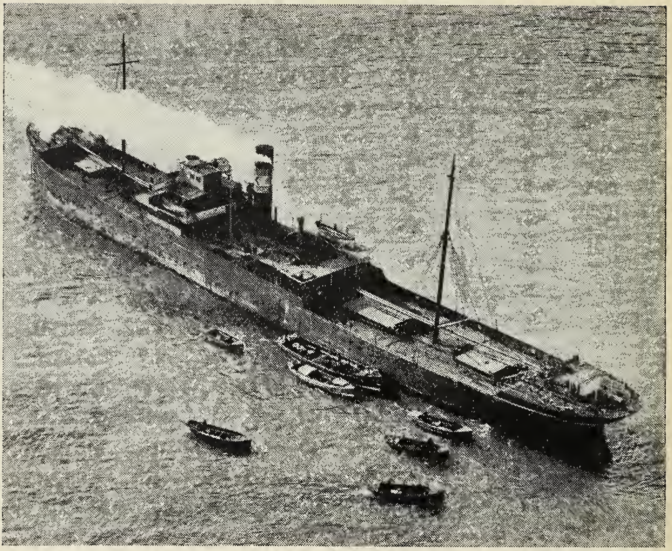
Now for a few words about cargo ships. Some products are carried by specially equipped ships, and are not dealt with by



Shanghai, China's most important port. [E.N.A.

the small tramp steamer. Oil from the Persian Gulf and Mexico comes to us in specially built oil tankers that are not used for anything else. Goods that are likely to go bad on the voyage are often carried in refrigerating chambers in express ships. These generally carry passengers as well, so that we can call them cargo-carrying liners. Chilled beef from the Argentine is brought to London by the Royal Mail Line. Liners from Jamaica bring us bananas, while passengers from New Zealand may come over on the same boat as a cargo of butter, cheese, frozen lamb, and apples.

We will next take an imaginary voyage in a " dirty little tramp " in order to understand the important part these craft play in world trade. Our tramp steamer is lying in Cardiff harbour, and already has on board a few hundred tons of cement, a large quantity of salt from the Cheshire salt mines, and is now loading up with steam coal. When all is aboard we sail slowly to the south-west at one-third of the speed of an Atlantic liner, and steer for the Canary Islands. These islands, as we can see from the map, lie at a meeting place

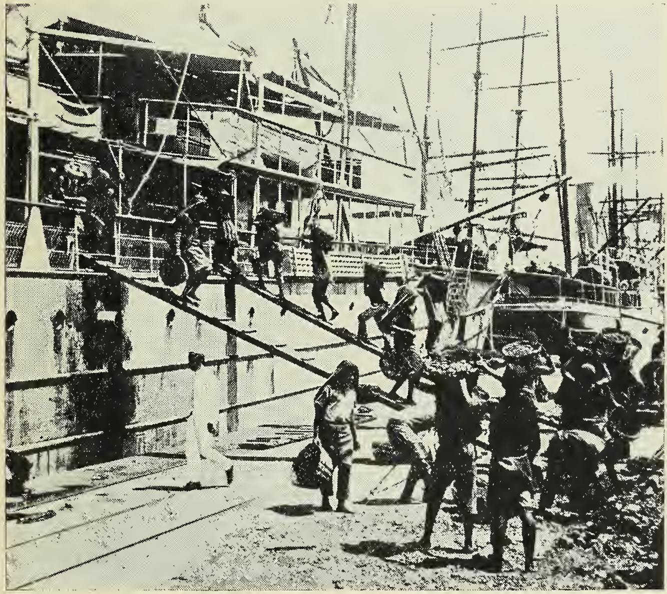


[Central Press Photos.

A tramp steamer aground on the Goodwin Sands.

of ocean trade routes, and large stocks of coal are needed for the ships.

We put in at the port of Las Palmas, and our coal is unloaded. Another ship is being loaded with bananas for England, but we push on to the Guinea Coast and unload our salt at Takoradi, on the Gold Coast. Our cement is to be delivered at Cape Town, and there is little for us to pick up here, for the palm kernels and cocoa grown in the Gold Coast are nearly all sent to England. We take up several tons of hard cabinet woods and set off for Cape Town. The timber and cement are unloaded, and, as there is little to be taken away, we sail round to Durban, in Natal. Behind this port is a coalfield, and a few hundred tons are taken aboard for Colombo. Here the coal is unloaded, and with little cargo in the hold the tramp pushes on to Calcutta, on the delta of the Ganges. Bundles of jute sacks due for delivery in Australia are here waiting. We pick these up, put in at Rangoon for some rice and teak, and proceed to Sydney. The cargo is here unloaded. From Sydney wool, wheat, dairy produce, and fruits are exported to England, but we go up to Newcastle, a little to the north, and fill up with coal to be taken to Chile. We steam across the Pacific to



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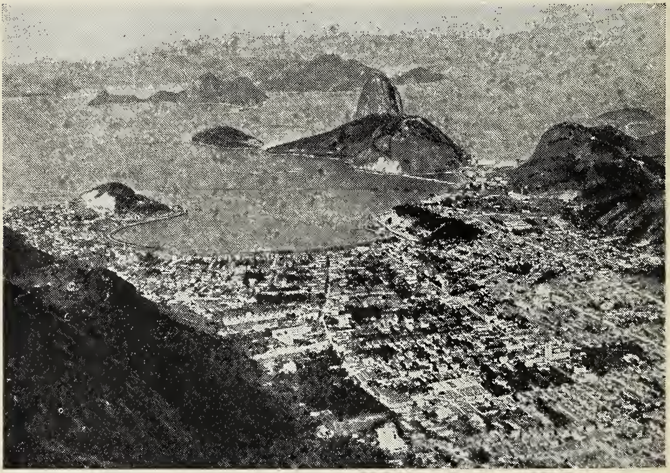
Coaling a ship at Durban.

Valparaiso. Finding little to carry from here, we turn northwards to Antofagasta, and load up with Chile saltpetre for New Orleans. From there we could go through the Panama Canal, but the charges are so high that the skipper steers southwards, round Cape Horn, and puts in at the estuary of the Plate. The beef from the pampas is exported in special cargo liners, but at Buenos Aires we load up with bales of wool and sacks of linseed for the United States and bundles of hides for England. We then call at Rio de Janeiro, and take on board some bags of coffee beans. Now we run along the north coast of South America, pick up some sugar at Georgetown in British Guiana, and proceed to New Orleans. Here the goods for the United States are unloaded, and we accept a cargo of cotton and cotton-seed cakes for England. The



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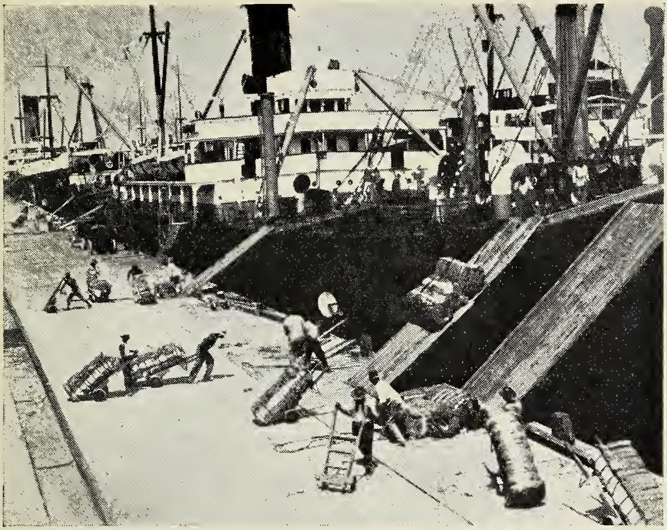
The beautiful natural harbour of Rio de Janeiro.



[Keystone.

Loading cotton on a ship at New Orleans.

shortest distance to the British Isles passes very near Nova Scotia, and the tramp calls at Halifax and picks up a good load of wood pulp. Then we steam eastwards across the Atlantic for a home port, which we reach after sailing all round the world.

EXERCISES

1. Examine the shipping advertisements in a newspaper. Insert each route mentioned by a line drawn on a map of the world. On each line you have drawn insert the chief ports of call, and alongside write the name of the shipping company that runs the service.

2. Arrange for an exhibition of postage stamps of the countries visited on a voyage from London to Yokohama.

3. Examine a globe and write down the four ways in which a ship can sail from Sydney in Australia to London. Measure the routes with a piece of string, and say which is the shortest and which is the longest way.

4. Look at a map of the world, and think which way a liner would go:
(*a*) From Jamaica to Liverpool and
(*b*) From Yokohama to San Francisco.

Now, with a piece of string, mark the shortest distance on a globe between these two pairs of ports. What differences do you notice?

5. Examine the "Movements of Liners" as published in *The Times*. Write down the name of one ship that is homeward bound on each of the following lines:

(*a*) Cunard-White Star.
(*b*) Royal Mail.
(*c*) Orient.
(*d*) Nippon Yusen Kaisha.
(*e*) Union Castle.
(*f*) Yeoward.
(*g*) Anchor.

Opposite the name of the ship write down the name of the port to which it is coming. Ships belonging to one company often have similar names. Give examples of this.

6. Make a list of the following ports, and opposite each write the name of at least one product that is shipped from it to England in large quantities: Buenos Aires, Montreal, Rangoon, Colombo, Sydney, Kingston (Jamaica), Takoradi, Stockholm, Christchurch (New Zealand), Singapore, New Orleans.

CHAPTER 9

PORTS

SHIPS need places where passengers can go on board or disembark and where goods can be loaded or unloaded. These places are situated in the ports. There are ports of all sizes upon the coasts of the different continents, but only a few of them are of really great importance. Why is it that one port is so much larger than another ?

The first thing to consider is the harbour. A big port needs a harbour where there is *calm water*: it is difficult to load and unload ships if they are rolling and tossing in rough waters. Calm water may sometimes be found well up a river mouth or in a bay with an entrance so narrow that stormy seas cannot enter. There are, however, few harbours that are well enough protected by Nature. Most of them have had to be improved by man, and some of them are entirely man-made. Before the Suez Canal was built there was no harbour at all at Port Said. To enable ships to enter the Canal at this point, two long breakwaters were built out into the sea to enclose an area of calm water. Colombo, the natural meeting place of several routes, had only a very poor harbour into which the summer monsoon used to blow with great fury. Here, again, protection was obtained by building great breakwaters.

A good harbour has *deep water*, so that a ship can float without danger of sticking on the bottom, not only along the central channel, but also right up to the edge of the wharves. Southampton has water so deep that the largest vessels can reach the docks.

In earlier times ports were built far up river estuaries, partly to be out of the way of rough seas and rougher pirates, and partly because water transport is cheaper than land trans-

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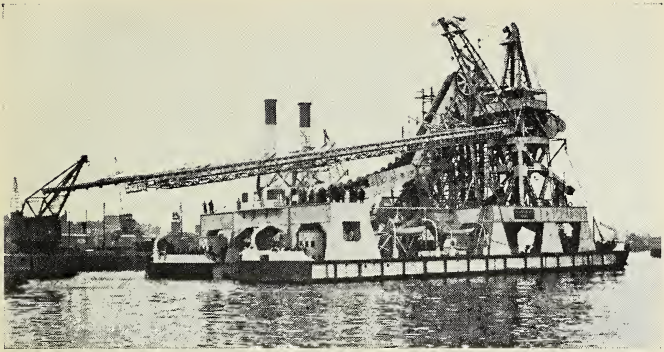
A steamer being loaded in Colombo harbour. Notice the breakwater on the right.

port. Ports, are, even in these days, placed as far inland as possible. Montreal on the St. Lawrence, London on the Thames, Hamburg on the Elbe, Buenos Aires on the Plate, are all examples of this.

As steamers grew larger many of the little ports inland lost their importance: their waters were not deep enough. In some cases, however, the rivers were dredged or deepened, and the port continued to thrive. Thus, for instance, the Clyde was dredged so as to allow big vessels to continue to use Glasgow as a port, and along the lower parts of the Thames dredgers are always at work to prevent the Thames from becoming shallow owing to the mud brought down by the river. Some old harbours, on the other hand, were not



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A giant dredger on the Seine at Rouen.

dredged, and lost all their trade. Chester, for instance, was an important port in Roman times, but its river, the Dee, is now quite useless for ocean-going ships.

In some cases it has been impossible to dredge or deepen a river sufficiently to take the biggest of modern liners, and a new port has had to be built nearer the sea. Thus Tilbury now handles some of the trade of London, and Avonmouth receives ships that cannot reach Bristol. Such ports as these are called "outports."

In earlier times small ships sailed up the river on a high tide and settled down on the mud at the bottom when the tide went out. Huge modern steel ships could not do this. To enable them to remain afloat all the time, large, deep basins, called docks, are built. Ships enter these basins at high tide, and, when the tide turns, strong gates are closed at the entrance and the water is shut in. In this way ships remain afloat even when the water in the river is low. At Liverpool passengers are often landed at a floating wharf that rises and falls with the tide, though the cargo boats unload in the docks.

A good harbour has *level land near the shore*, where warehouses can be built, and over which railways can run easily to connect the port with places inland.

A good harbour should be *free from ice* in winter. Along the north coast of Siberia there are a number of wide, deep bays that would make splendid harbours, but they have no ports, partly because few people want to go there, but partly because it is impossible to reach these shores except in summer: during the winter the Arctic Ocean is frozen. The freezing of the water in the harbour is a great handicap to a number of otherwise excellent ports. Montreal, so important during the summer and the autumn, ceases to be a port in December; from then until May the St. Lawrence freezes and the channel is blocked with ice. The harbour at Boston, in the United States, is sometimes frozen, and even at New York shipping is, now and then, interfered with by ice.

In Europe, though the harbours around the North Sea are usually free from ice in winter, those around the Baltic are closed. Powerful ice-breaking steamers are employed to open channels for the cargo ships that carry timber from Sweden, Finland, and Russia, but shipping is often held up for long periods.

Strangely, there are some ports in the world that have no harbours at all. Along the Guinea Coast of Africa the great Atlantic rollers break about two miles from the shore, forming a dangerous belt of surf along the coast. Except at two places, steamers anchor in the open sea, and load and discharge their cargoes by means of specially built surf boats.

Much of the petroleum exported from Mexico reaches the sea at Tuxpan, on the Gulf of Mexico, but the small bay at Tuxpan has a sandbank across its mouth, so that ships cannot

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Ice-breaking steamers cutting a channel through the frozen Gulf of Finland.

enter. The oil tankers anchor in the open sea and the oil is pumped into them through a floating pipe line.

Something more than a good harbour goes to the making of a good port. There are plenty of splendid harbours that have no port at all. *The largest ports are near important trading countries or on important trade routes.* In the south of Chile and on the west coast of the Highlands of Scotland there are excellent harbours. There are, however, so few people living near these harbours that trading vessels do not enter. Moreover, the harbours are on the way to nowhere and cannot be used as ports of call. Galway, in western Ireland, and Milford Haven, in Wales, have much better natural harbours than Gibraltar, but far more large ships call at Gibraltar because it lies on an important ocean trade route and can be used as a coaling station. San Francisco, on the west coast of North America, has a magnificent harbour, and is a large port, but it has nothing like so much trade as New York. It faces the wrong way. It looks towards the eastern coast of Asia, across the Pacific Ocean, which is here so wide that San Francisco is actually nearer to the North Pole than it is to Japan. New York, on the other hand, has become one of the world's greatest seaports, not only because it has a wide, deep harbour, but partly because it is nearer to western Europe than any other port in the United States except Boston; and Boston, as we have seen, suffers from the presence of ice in winter.

Ships do not visit harbours, however good, unless they can do business there. The amount of business that can be done depends partly on what there is in the land behind the port, in the " hinterland " as it is called. Cardiff, in South Wales, has grown to be a great port, because just behind it is a rich coalfield whose hard coal, or anthracite, is wanted almost all over the world. Newcastle began to grow for a similar reason: in its hinterland is the Northumberland and Durham coalfield.

The greatest ports have *busy, densely peopled hinterlands.* They serve, not a little area just inland, but act as gateways to wide, rich areas. They are connected by river, road, rail, and canal, with the interior of some country or continent, and are so placed that they can easily receive and forward both goods and passengers from and to all parts of the world.

New York, as already pointed out, has an excellent harbour which is ice free in winter and is opposite the trading nations of Europe. But the real reason why it is bigger than any other port in America is because it can more easily reach the great farm-lands of the Central Plains. It stands, as it were, at the entrance to a long, low passage through the mountains that lie parallel to the east coast of the United States. This passage is provided by the valleys of the Hudson and the Mohawk Rivers, and is used by road, rail, and canal.

New York City is built at the mouth of the Hudson on the island of Manhattan. Because the island is small, the build-

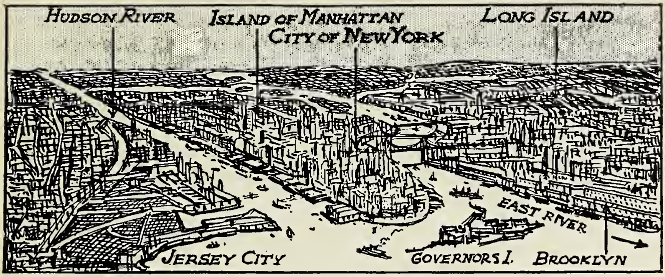


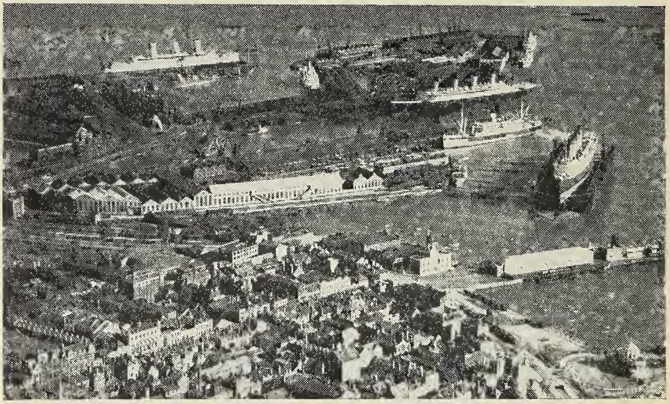
Diagram showing the position of New York City.

ings have had to grow higher and higher: they could not spread sideways. Some of these tall buildings—skyscrapers—will house fifteen thousand people. From the top of any one of them can be seen numerous wharves, warehouses, and piers down by the waterside. On the water itself are barges, trans-Atlantic liners, tugs, cargo boats, and huge ferry boats that cross and recross the water to connect the island with the mainland.

In some cases the hinterland has valuable things to sell, but is not itself densely peopled. Here the ports remain small. Ships call at Aberdeen for granite, at Fowey, in Cornwall, for china clay, at Bilbao, in Northern Spain, for iron ore and at Valencia, in the east of Spain, for oranges that are grown near the coast. They take away what the hinterland provides, but they carry little for use in the hinterland, because there are few people living in it.

Changes in trade routes, such as the opening of the Suez and the Panama Canal, decrease the trade of once important ports and increase that of others.

Goods are carried to and from the ports by river, rail, road, or canal. Coal from the Ruhr Coalfield, in Germany, goes



Southampton docks photographed from the air. [Aerofilms.

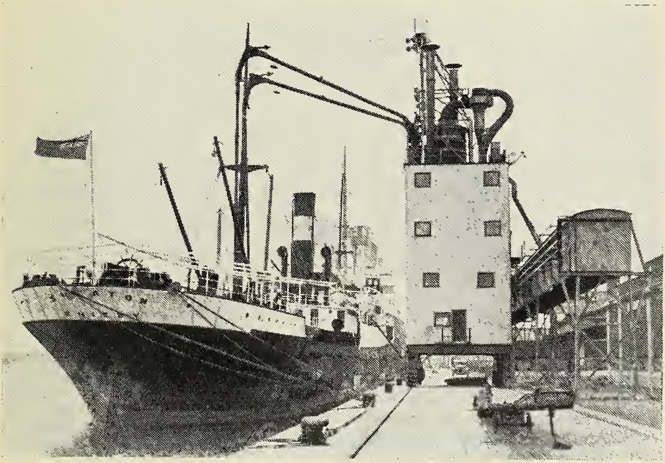
down the river Rhine to the steamers at Rotterdam, wheat from the prairies travels by rail and by lake steamer to Montreal. In the case of London, Liverpool, Southampton, Genoa, Buenos Aires, and Marseilles, the carrying is almost entirely by rail. The railways of the British Isles centre on London, and if these were destroyed London, as a port, would be crippled.

On the other hand, the carrying trade of the railways depends largely upon the trade done at the ports. The English railway companies have realised this inter-dependence, and in addition to improving their transport service they have actually improved the ports. The modern improvements at Southampton are mainly due to the enterprise of the Southern Railway, just as those at Harwich and Immingham are to the London & North Eastern Railway.

The greatest port in the world is London, yet few people in London ever see any ships: the ships are hidden away in enclosed dock basins to the east of the city. These basins have been dug out of low-lying ground on each side of the river. Altogether they cover about five square miles, and contain many miles of quays at which ships can moor.

Along the quays there are railway lines, long sheds where goods can be loaded into trains under cover and large warehouses where they can be stored. Special machinery is often used to deal with some special kind of cargo. In one part of the docks, for instance, wheat is sucked out of the holds of the ships through pipes in order to be stored in elevators. Nearby is one of the largest flour-mills in England.

Frozen lamb, chiefly from New Zealand, is removed on a canvas belt. The belt is lowered into the hold, the carcasses are placed on it, and away they go one after another to the cold-storage warehouse.



[Keystone.

Unloading grain by suction methods at the docks.

Wines from Spain, Portugal, and elsewhere are stored in acres of underground vaults.

One of the largest buildings is the wool store. If all the floors of this building could be spread out on the ground, twenty games of football could be played on the area (thirty acres) covered by them. Here wool from Australia, New Zealand, and the Argentine is stored till it is sold by auction. Another building contains tens of thousands of large barrels of tobacco; another, piles of sheet rubber from Malaya; another, valuable elephants' tusks from Central Africa.

A great many goods come to London to be sold, not in England, but to other countries. They are exported again without ever leaving the docks. London is the biggest world market for rubber, tea, and wool.

Other goods must not be stored. They must be sent away by train or lorry as soon as they arrive. Chilled beef is a good example of this type of goods. As soon as a steamer from the Argentine is moored, unloading begins. The heavy joints from the cold chambers of the ship are hung up on hooks that run along an overhead rail. One after another the joints are carried over the quay to a waiting train, into which they are loaded and dispatched to the central meat market.

The docks are also well equipped for supplying steamers with fresh water and with coal, while farther down the river there are immense storage tanks where oil-burning ships can fill up with petroleum.

EXERCISES

1. With the help of an atlas name the chief port that serves each of the following regions: the prairies of North America; the pampas of the Argentine; Egypt; Ceylon; Malaya; the Ganges Basin; the Yang-tse Basin, and the cotton-growing Southern States of North America.

2. Explain what you understand by the terms outport, hinterland, artificial harbour.

3. Make a list of ten important ports that are situated at the mouths of rivers. Opposite each write the name of the river and of the country in which the port lies.

4. Write down the names of:

(*a*) Three ports (one in Africa, one in North America, and one in Asia) that stand on or very near the delta of a river.

(*b*) Three ports (one in Europe, one in North America, and one in South America) that stand up a river estuary.

(*c*) Two ports (one in North America and one in Asia) that stand at the end of a trans-continental railway.

5. Name one port from which each of the following products are exported in large quantities: rice, wheat, coal, wool, rubber, cotton, fruit, beef.

6. Give examples of the following types of ports in the British Isles:

(*a*) A port for transporting passengers across the Atlantic.

(*b*) A port for transporting cargo but few passengers.

(*c*) A fishing port.

(*d*) A ferry port for passengers and cargo bound for the continent of Europe.

7. Name another port which, like London, receives goods in order to export them again. Describe its position and trade.

CHAPTER 10

AIRWAYS

IN recent years airships and aeroplanes have given us new forms of transport.

From the earliest times man has watched the action of birds, wished he could soar, like them, into the air, and fancied that some day he might be able to imitate them. In ancient Greek stories we are told that Perseus had wings on his feet that enabled him to fly, and that Icarus also flew by means of wings fastened to his shoulders with wax. These fairy tales show that the ancients thought about flying long before anyone dreamed of steam engines and motor-cars.

Man's attempts to fly can be placed in two classes: (1) by the use of balloons; (2) by the use of wings.

A balloon will rise so long as it is lighter than air. Although several early attempts were made to construct large balloons, no real success was obtained until hydrogen was discovered. Hydrogen is a very light gas, and if a bag, also light, is filled with it, the bag will go aloft. As a result of this discovery balloons were made that could lift one or two men, and a number of successful flights took place.

Such balloons, however, were not of much use to travellers or traders because they could go only where the wind blew them, and no one could say, beforehand, where they would come to earth. It was not till the petrol engine had been invented that it was possible to drive and steer an envelope filled with gas. With the coming of the petrol engine we obtained the airship.

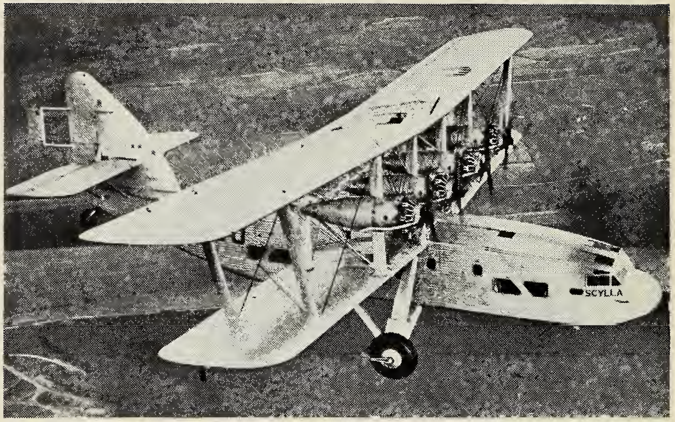
In England the airship is not popular, and is not used, but in Germany there is more faith in such ships. In 1928 a giant airship, the *Graf Zeppelin*, managed to fly right round the

The *Graf Zeppelin* flying over Cairo. [E.N.A.

world. The *Graf Zeppelin* is fitted with a large comfortable room in which to sit, a dining-room, and a kitchen. It has a crew of twenty-six men, and can carry a load of a hundred tons.

Airships are lighter than air, and will keep afloat though the engine stops. Aeroplanes, on the other hand, are heavier than air, and, like birds, are kept up by means of wings. The first attempt to fly was made over four hundred years ago. A man fitted wings of feathers to his legs, jumped off a high tower, flapped the wings, and glided for about two hundred yards, but broke his leg as he landed. More than two hundred years later another plucky man, with muslin wings, jumped from a window sill and sailed over his neighbour's house. But, as in the case of the balloon, little progress was made until the petrol engine was invented. After that it was not so very long before aviators crossed the ocean and encircled the world.

An aeroplane is forced through the air by means of propellers driven by powerful petrol engines. It is kept up by



[Courtesy, Imperial Airways.

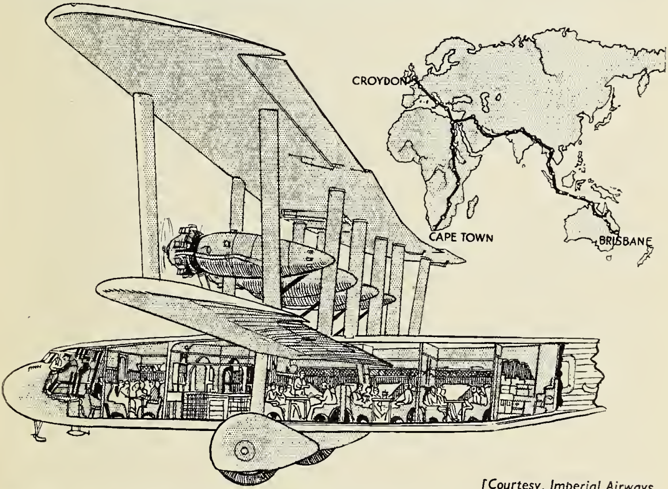
One of the big air liners used on the London-Paris route.

one or two pairs of wings that do not flap, steered by a rudder similar to that of a ship, and made to rise or sink by another kind of rudder that moves up or down.

The big aeroplanes, or air liners as they are called, are immense and splendidly built machines. When they are in the aerodrome they spread their enormous wings far away over one's head, and the wheels on which they rest are so large that a boy could crawl round the inside of the tyre. The large body in which the passengers travel contains two very comfortable saloons, one forward and one aft, each able to seat ten or twelve people. On each side are large windows so that the travellers can enjoy the view as the plane speeds along. Between the saloons is a pantry, from which a steward serves meals and refreshments. In addition there is sufficient storage room for the mail bags and for a certain amount of passengers' private luggage. In the very front are two pilots, who sit, side by side, each with a steering wheel and a set of controls to govern the flight of the machine. Behind them is the wireless operator, who can keep in communication with the land even when the liner is a few thousand feet up in the air.

In front of the upper wings are two or four propellers worked by separate engines that roar loudly as the aeroplane rushes through the air.

To understand how these aeroplanes carry out their work, let us take, in fancy, a journey, say, from London to Paris. Roads, railways, and canals usually run right into a town, but an aeroplane needs a big space in which to land, so that the terminus, that is, the aerodrome, or airport, must be some distance away. The aerodrome for the London to Paris air-service is at Croydon, about ten miles from London, and the journey to Croydon is usually made by car.



[Courtesy, Imperial Airways.

Diagram of the inside of an air liner of the type shown on the opposite page.

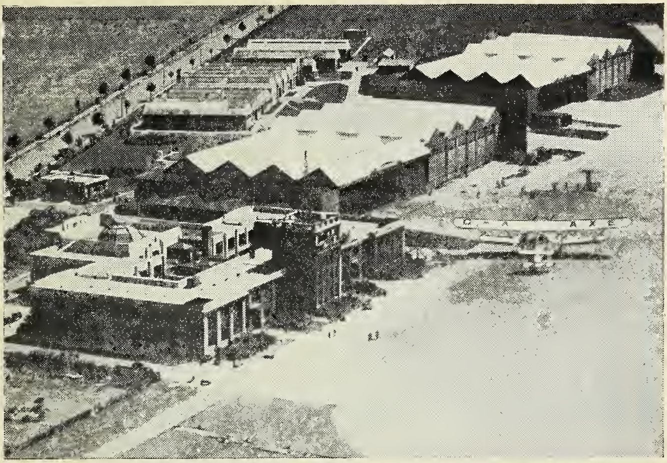
At the aerodrome are huge sheds, or hangars, in which the aeroplanes are kept when not in use. Round the landing ground are a number of powerful electric lamps to enable landing to take place after dark, and a tall lighthouse, whose bright rays can be seen for many miles. From four tall masts hang things that look like huge stockings. These are blown out by the breeze, and tell the pilots a great deal about the force and direction of the wind. It is very important that the pilots should know all there is to know about the weather they are likely to meet.

There is also, at the airport, a control tower that takes the place of a signal box on a railway. Here are the wireless operators who keep in contact with the air liners while they are in flight, and give them any advice they may need, and also the controller who gives the " all clear " to those pilots who are about to take off.

There is an office where incoming passengers have to produce their passports and another where their baggage is examined by Customs officials; the work done at an airport is, in fact, very similar to that done at one of the seaports along the coast.

When we arrive at Croydon, our baggage is weighed, our passports and tickets examined, we mount a short ladder, and enter one of the saloons. Soon all the mail bags are stowed away towards the tail of the machine, and the porters have carried our luggage to a central place between the two saloons. Punctually to time, and without any fuss, the engines begin to roar, the liner sweeps across the turf, and we rise gracefully into the air.

We travel towards the south-east, high above the Downs and the orchards of Kent, to Dungeness. Almost immediately the French coast comes into sight. We cross this near Calais and in another hour we land in the airport for Paris.



[Courtesy, Imperial Airways.

Croydon airport, showing the hangars for the aeroplanes and the general building on the left.

The flight from London to Paris takes only two and a quarter hours. The fastest journey by train and boat takes about seven hours, so that passengers and letters that go by air save nearly five hours of precious time.

Nearly all the capitals of European countries are now linked together by regular air services, and a first-rate system of airways has been organised in North America. We have not space to deal with these routes, but it may be interesting to describe the British airways that connect London with Cape Town and with Australia.

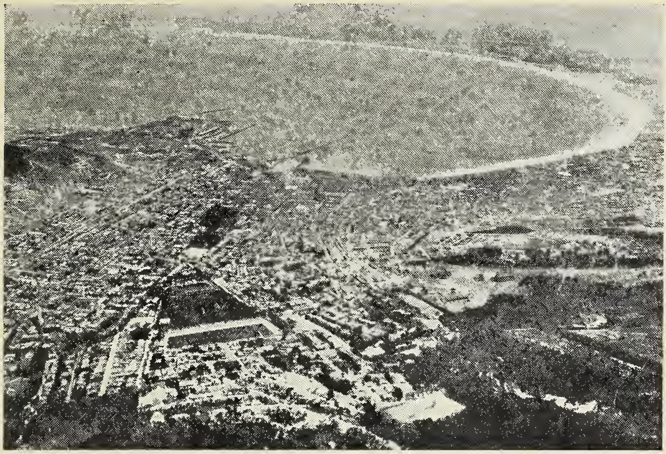
We go by air from Croydon to Paris as already described, but from Paris to Brindisi in Italy we must go by train, because certain nations will not allow us to fly over their land. At Brindisi we enter a seaplane, skim across the water, rise into the air, and travel south-eastwards over the Ionian Sea across Greece to the ancient city of Athens. We then fly across the Mediterranean Sea, over the island of Crete, and come to rest in the harbour of Alexandria in Egypt.

At Alexandria we take a train that carries us across the delta of the Nile to Cairo, the capital of Egypt. Next morning we enter the air liner by means of which we shall finish the journey to Cape Town. We go southward, following the course of the Nile, pass the great dam at Aswan and another near Khartum, which is storing up water with which to irrigate the cotton-fields of the Egyptian Sudan. As we wing our way, still southwards, we notice great changes taking place in the vegetation below us. Far away on each side of the Nile the land was desert; in the Sudan there is grass; farther south the grass becomes richer and ranker, and patches of forest begin to appear. Here is the home of the rhinoceros, giraffe, zebra, and elephant.

We pass over Lake Victoria, the great lake on the Equator, stare at the green sea of the equatorial forest, cross Kenya and Tanganyika, fly above the farm-lands of Rhodesia, the gold mines of Johannesburg, the diamond mines of Kimberley, and, ten days after we left London, are safe at Cape Town in the far south of Africa.

Before it was possible to use such an air route as this, a great deal of work had to be done on the ground. Aerodromes had to be made, and first-class hotels built: the air liners do not fly at night, and the passengers need somewhere to sleep in comfort. Some of the hotels are built in lonely places, where few or no white men have ever been before.

The airway to Australia follows, as far as Alexandria, the same route as that to the Cape. After leaving Alexandria, however, we turn to the north-east and reach Gaza, on the coast of Palestine. We fly over Bethlehem, across the cliff-



[Courtesy, Imperial Airways.

Cape Town as seen from the air.

lined shores of the Dead Sea, and over miles of treeless desert. We spend the night at a comfortable hotel built in the midst of the wilderness.

Early next morning we continue our flight eastwards over more miles of desert sands to the Euphrates. Here we turn south to Baghdad, the date groves around Basra, the pearl-fishing beds of the Persian Gulf, and then east along the coast to Karachi in India.

Karachi, near the mouth of the Indus, is an important seaport. It exports the wheat and cotton of the Punjab, is the gateway to the valley of the Indus, and is the first port of call in India both by sea and by air. After leaving Karachi we cross the northern plain of India, call at Delhi, the present capital of India, Cawnpore, Allahabad on the Ganges, and arrive at Calcutta, the chief port of the Ganges basin.

From Calcutta our route lies along the coast of Burma to Rangoon, and over forest and mountains to Bangkok, the capital of Siam.

We next travel southwards over the rubber plantations of Malaya to Singapore, continue along the curve of the East Indies, cross the wide stretch of water known as the Timor Sea, and reach Australia at Darwin.

Each year sees new and better air services. Two air services now run weekly to Johannesburg and Singapore.

The great air race of 1934, in which a racing plane reached Australia from England in four days, set people asking why air mails could not reach Australia in four days. There are several answers to this question. We have already said that some nations will not allow us to fly over their country. For the air race, however, they gave special permission to do this: they would not grant such permission to ordinary air-mail planes. Then, too, one has to think about safety as well as about speed, especially when a company promises to carry passengers and mail regularly.

At the present time it is difficult to fly over great oceans, because there is often nowhere to land if anything goes wrong with the engine, if bad weather is met with, or if petrol is needed. It is being suggested that floating aerodromes should be set up in the ocean at suitable distances apart. If this proves to be possible, the difficulty of flight from Britain to other parts of the world will be much less.

Britain is so small that not much time is saved by flying about it. But in vast countries like Australia, where the railways are few and the roads are poor or may be impassable in bad weather, the aeroplane is of great value. In Australia some farmers have their own aeroplanes, and use them to fly to the nearest town, often many miles away, to do their business or for many other purposes for which motor-cars would be

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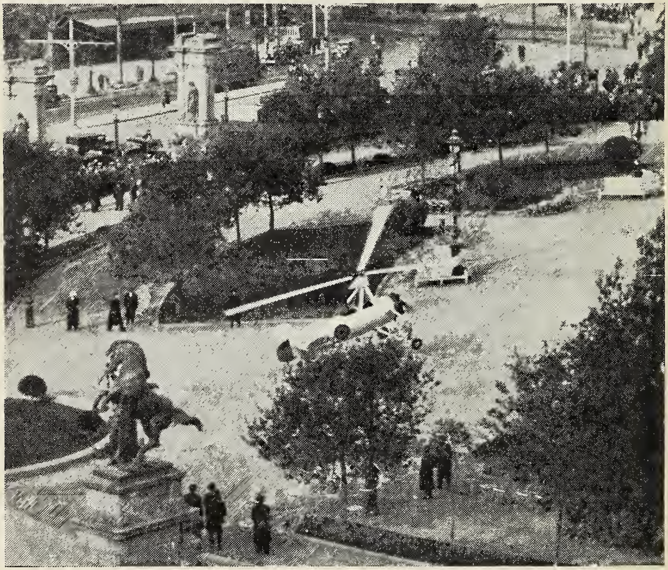
An aeroplane spraying insecticide over grape-vines in a Californian vineyard.

used in Britain. Aeroplanes are also of great value in other lands of long distances, such as the United States and Russia.

Although this chapter is chiefly about aeroplanes for transport, it is interesting to remember that in Africa and Russia the aeroplane is used to throw poison on the great flights of locusts that do so much damage to the crops, and that, in the great forests of Canada and the United States, they fly about looking for outbreaks of fire, so that the fires can be put out before they spread too far.

At present the aeroplane needs a large aerodrome or landing place, and this, as already pointed out, has to be placed some distance away from the centre of a great city. But a new kind of machine, called an autogiro, does not need so much space in order to taxi off the ground. In November 1934 one of these machines took off from a *street* in Paris and landed again safely in the same street. If this kind of machine proves airworthy, it may make a great deal of difference in the position of the aerodromes.

Though Britain does not seriously need the aeroplane for home use, she needs it to keep in touch with the different parts of the Empire. In order that as full use as possible be made of it, much constant study must be made of the weather and much constant forethought be given to providing aerodromes, fuel, and hotels at suitable spots; and because the Empire is scattered all over the world, it is weather all over the world that has to be studied in order that the pilots may be well informed.



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An autogiro about to rise from a street in Barcelona.

Each route becomes safer according to the number of stations along it where there can be wireless apparatus and night flares to guide the pilots. In the case of the British Empire it is difficult to obtain such routes because Britain is separated from the rest of the Empire either by long stretches of sea or by countries under other Governments.

EXERCISES

1. On a map of Europe and Africa trace the air route from Brindisi to Cape Town from the following table:

Place	Country	Day	Time	Miles Travelled during the Day
Brindisi . .	Italy	Friday	6.0 a.m.	—
Athens . .	Greece	Friday	11.40 a.m.	—
Alexandria . .	Egypt	Friday	7.0 p.m.	—
Cairo . .	Egypt	Friday	Evening	1,070
Khartum . .	Sudan	Saturday	Evening	1,150
*Juba . .	Sudan	Sunday	Evening	760
Lake Victoria .	Uganda	Monday	1.0 p.m.	—
Nairobi . .	Kenya	Monday	Evening	1,339
Lake Nyasa .	Tanganyika	Tuesday	Evening	660
Salisbury . .	S. Rhodesia	Wednesday	Evening	815
Bulawayo . .	S. Rhodesia	Thursday	10.0 a.m.	—
Johannesburg .	Transvaal	Thursday	Afternoon	680
Kimberley . .	Cape Province	Friday	10.15 a.m.	—
Cape Town . .	Cape Province	Friday	Afternoon	810

* This town will not be marked on a school atlas.

2. Answer the following questions with reference to the table in Question 1:

(*a*) How far does an aeroplane fly in going from Cairo to Cape Town ?

(*b*) What is the greatest distance flown in one day between Cairo and Cape Town ?

(*c*) What is the average daily flight between these two towns ?

(*d*) About how many hours does the journey from Cairo to Cape Town take ?

3. Suggest why an air liner from London to Cape Town does not fly to Gibraltar and then due southwards.

4. Make a collection of the postage stamps of the countries seen on a journey by air from London to Australia.

5. Make a list of the seas, another of the islands, and another of the countries flown over by an aeroplane from Brindisi to Australia.

6. Look in some book and find out all you can about flying feats of the following men: Lunardi, Count Zeppelin, Wilbur Wright, Cody, Blériot, Ross Smith.

7. If any boy in the class has a model aeroplane, ask him to bring it to school and explain how it works.

CHAPTER 11

MEANS OF COMMUNICATION

TRADE could not be carried on unless people were able to send messages, but long before trade became so important, in fact, all through the ages, people have wished to communicate with each other. Deserts, high mountains, forests, wild beasts, wild men, and storms have, at different times, made some communications difficult or impossible.

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The headman of a village in Uganda beating a drum to call the natives together.

In many parts of the world messages must still be sent by word of mouth, though the carriers may travel by camel, reindeer, dog team or kayak, or, perhaps, on foot. The negroes, in some districts of Africa, communicate with each other by "talking on drums." It is very hard for us to understand how they do it. We, of course, could send letters and spell out words if we had a code, but these negroes are said not to spell but to talk. One man beats out the message on a drum. Others, a mile or more away, hear it, understand it, beat it out again, and so pass it quickly for quite long distances.

In Britain, at times of national danger, messages were sometimes sent across the land by means of beacons lit upon the tops of church towers or on the summits of hills. When one of these flares was seen at night, far away in the distance, another would be lighted, and an alarm would be spread, though no one would know exactly what the danger might be.

Before the introduction of railways the fastest method of sending a message across country in Europe was by means of a rider on horseback.

> " *I sprang to the stirrup, and Joris, and he;*
> *I galloped, Dirck galloped, we galloped all three.*"

So, Browning tells us, did the " good news " travel from Ghent to Aix.

How do we communicate with each other, at a distance, in modern times ?

In any of the leading countries of the world, posting a letter is such a simple matter and the sender is so sure it will reach the person to whom it is addressed that very few people trouble to think what happens to the letter on its way. In Great Britain alone, nearly twenty million letters are posted every single day, and yet we seldom hear of any one of them being lost. We put a letter, addressed, let us say, to Mr. X at Liverpool, into a box in one of the suburbs of London before we go to bed. It will be safely delivered to Mr. X, possibly before he gets up next morning. What has happened to that letter while we have been asleep ?

A postman, on a bicycle perhaps, collects the letters from the box and takes them to the local post office. Here they are sorted according to the routes along which they have to go. Those for London and for distant towns are kept separate, are

[Courtesy, G.P.O.

Sorting letters and postcards, and putting them into bags for despatch to London suburbs.

put into bags, and taken by motor-van or train to London. Thousands of bags of letters and postcards arrive at the sorting office of the General Post Office in this way, and our letter is in one of these bags. At the sorting office they are again divided according to the routes they have to take. Those addressed to towns along the L.M.S. railway through Lancashire are kept separate and bags full of them are taken to Euston station and put into a special mail van. While the train steams northwards, postal officials are hard at work. They sort the letters, now according to towns, and place those for each town in a separate bag. At many of the smaller towns the train does not stop and the bag is dropped, by a special device, into a strong net placed alongside the line.

When the train pulls up at Liverpool the sacks of mails are taken by motor-van to the post office, and sorters once again separate the letters, this time, according to streets. They are then placed in their correct house order, and a postman delivers them to their rightful owners.

We see, then, that to deliver our letter to an address in Liverpool, a railway train, a bicycle, and one or more motor-vans have been used as a means of transport and several different groups of sorters have handled it, all for the cost of the stamp that is stuck on the envelope.

In the past, if we wished our letter to go faster we could pay a little more and have it sent by air. But the Postmaster-General is now arranging for letters posted in the ordinary way to be delivered in large towns either by train or by air, whichever is quicker. Letters to be sent by air mail to the Continent or to other parts of our Empire must pay more, and have a special stamp, but an increasing number are sent by air every day.

Scientists have invented quicker methods of sending messages by making use of an electric current flowing along a wire. The first telegraph to be used commercially was invented by an Englishman, named Wheatstone, a century ago. Then an American, Morse, improved on his methods and the Morse system was put into use in Britain soon after the introduction of railways. This has now largely given way to other and even quicker methods.

The telegraph is much used on railways to arrange the passage of trains, by business men, Government officials, reporters for newspapers, and by many others who need to send messages quickly. Formerly, all telegrams were taken out by boys and delivered at the house. But now, if a person is on the

[Courtesy, G.P.O.

Operators tapping on the keyboards of teleprinters messages to be sent as telegrams.

telephone, the post office will telephone the message on the telegram to him, and he also may " phone " his telegrams to the nearest post office instead of taking it round. This saves much time.

Telegrams can be sent, not only over the land, but across the sea, by means of a long, thick cable. The wires in the cable are heavily coated with gutta-percha to keep the electricity from escaping. To protect the cable from damage, it is packed round with hemp and bound round with steel wire. In time the steel would rust away, so this, in turn, is covered with more hemp and pitch. The cable is very heavy, and it is a difficult matter to lay it on the bed of the ocean. The first cable was laid on the bottom of the Atlantic, between North America and Europe, in 1866, and at once shortened the time of communication between these two continents from weeks to minutes. To-day there are many cables, and the larger seaports, all over the world, are connected with them.

The telephone was invented about forty years after telegraphy. This, too, is worked by electricity, but there is no need to tap out letters on a key. The speaker's voice is heard by the person at the other end of the line and ordinary conversation can be carried on just as if the two people were in the same room.

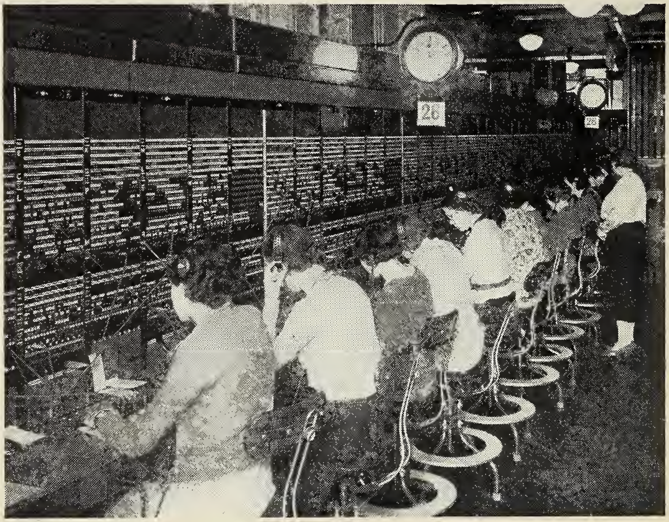
Sending a telegram or telephone message does not keep so many people busy as sending a letter. The operators in the exchange, however, have plenty to do connecting one line with another in order to put through a call.

The telephone is a wonderful invention; one can sit down quietly in a chair and talk to almost anyone in the world so long as they are " on the phone." If you wish to speak to an uncle in Sydney you just lift the receiver and say something like: " Trunks . . . Sydney, Australia, 5472, wanted by Cranbrook 0571," and in a very short time your bell will tinkle and you will hear your uncle talking to you.

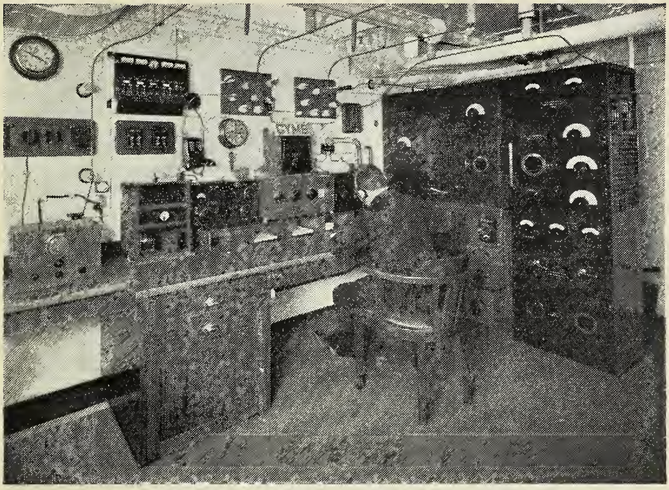
What is even more wonderful is that you can ring up and talk to a passenger on board a ship. The liner may be in the middle of the ocean, but it makes little difference. You just name the ship, and the operator at the local telephone exchange will do all the rest for you, but the cost is naturally rather heavy.

At the International Telephone Exchange in London each operator speaks more than one language. Operators in this Exchange must be really fluent in the languages they undertake, since there is no time to look at a dictionary. In 1934 cheap rates at night for telephoning over long distances in the British Isles were arranged, and many people now ring up, at night, their friends in distant towns.

Messages to ships and many of the long-distance calls to different parts of the world are sent by wireless. We have all listened to broadcast talks and concerts, and most boys know something of the way in which a wireless set works. We must not think, however, that wireless is used only to give us pleasure and amusement. Much of our news is now flashed across the ocean by wireless from the great beam stations: the pilots of aeroplanes in a fog can tell where they are by means of wireless rays ; motor police, in their patrol cars, can hear where they



A part of the International Telephone Exchange. [*Courtesy, G.P.O.*



[Courtesy, *Marconi's Wireless Telegraph Co., Ltd.*

The wireless apparatus on board a ship.

are urgently wanted, and the captain of a ship can let others know whether his ship is in serious danger and needs help. Wireless stations along the Arctic shores of Europe and Asia are making navigation possible by reporting to ships on weather and ice conditions.

EXERCISES

1. Read Macaulay's *Armada*.
2. Read Browning's "How they Brought the Good News from Ghent to Aix."
3. Find out all you can about the work of Rowland Hill, Samuel Morse, and Guglielmo Marconi.
4. Work out the route along which a letter would travel from your own town to Newcastle.
5. Ask (1) a pupil to give a lecturette on wireless, and (2) a scout or guide to give another upon Morse signalling.
6. Make as long a list as you can of the different ways in which electricity has been used to help mankind.

[Will F. Taylor.

The rolling prairie-lands of Canada, where there are thousands of cattle but few people.

CHAPTER 12

WHERE PEOPLE LIVE

IF all the people in England were spread evenly over the whole country, there would be about eight hundred on every square mile. If all the people in Australia were spread evenly over the whole of that continent, there would be only about two on every square mile. Let us see why there should be such great differences in what is called the " density of population."

As a general rule, we can say that large numbers of people will want to live in a place where they can obtain food, clothing, and shelter with some ease, and that they will avoid those places where living is uncomfortable or difficult.

On the whole, high mountains and plateaus have few people. The climate is too cold for the growing of crops, the ways are rough, and the rocks are many. The plains at their feet are warmer, the soil is usually more fertile, and it is easier to move about. Amongst the most favoured of the lowlands are certain river valleys, such as those of the Nile, the Euphrates, and the Tigris, which had large populations at an early date in human history. In parts of South America, however, many more people live on the cool plateaus amongst the Andes than on the hot, steamy plains at their feet.

[Keystone.

Densely packed crowds at the Mansion House in London on Armistice Day.

Man has adapted himself to life in very many different kinds of climate. Three types, however, are so unfavourable to human life that dense population is impossible, at any rate in our present state of knowledge of how to overcome climatic hardships:

(1) Very dry desert where the rainfall is under 10 inches per annum and where there is no river to supply water, e.g. the Sahara.
(2) Very cold desert, where for the greater part of the year rivers and land alike are frozen, e.g. the tundra.
(3) Very hot regions with constant rainfall, e.g. the Amazon basin.

We have seen, in this series of books, how people get a living as collectors, hunters, fishermen, herders, cultivators, miners, manufacturers, or traders. We may now note what these different occupations have to do with density of population.

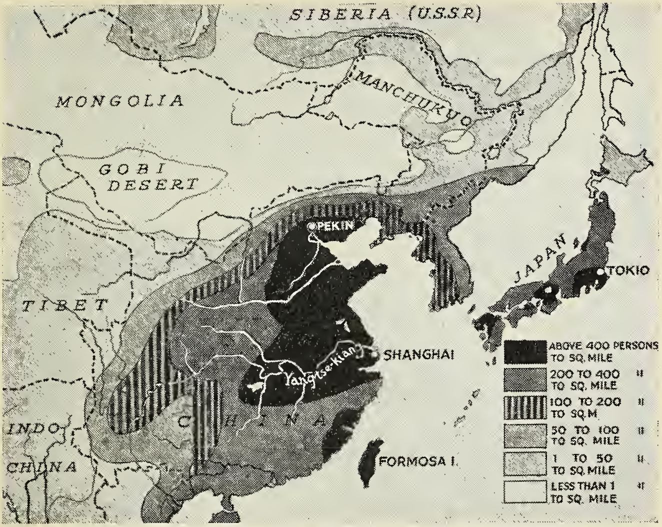
When hunting is the chief occupation the population is sparse. Even a small hunting tribe needs a large area of land or all the game would be quickly killed or run away to safer areas. Hunters must live far apart.

Herders, too, need a large area of land in order to provide food for their flocks, and one family can look after, say, hundreds of sheep. Pasturing is another occupation that does not allow of a dense population.

Cultivators can live much closer together, but not equally close in all parts of the world. In some farming areas, as we shall see presently, there are millions of people; in others there are very few. In Saskatchewan there are fewer than four people to the square mile.

Manufacturing, mining, and trading all encourage men to settle closely together. They give rise to dense populations.

The most densely peopled parts of the world are: (1) India, China, and Japan; (2) Europe and the British Isles; (3) the



Map of China and Japan showing how the population is distributed.

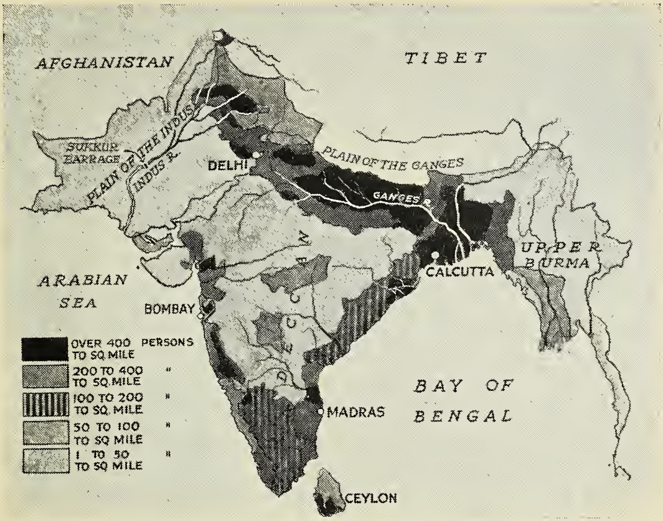
eastern part of North America; (4) Egypt, and (5) Java. More than half the population of the world lives in Asia and most of it is crowded in areas where food crops are grown, especially when the crop is rice: the rice-lands of the south-east of China and certain parts of India support huge populations because the climate is warm all the year round; there is no winter season to check growth.

The most densely peopled part of China is the valley of the Yang-tse-kiang. Here climate and soil are both suitable for rice, and its cultivation has reached such a pitch that every two acres of ground will support five people. The Chinese farmer is an *intensive* tiller of the soil, that is, he gets the last possible ounce out of it. He understands about the rotation of crops, and sometimes sows as many as four different crops annually, one after the other in one field.

Such careful tilling of the soil meant that large families were, when the land was first cultivated long centuries ago, very much to be desired. Each new member of the family meant a new helper in the fields. It became the custom to marry early and to have as many children as possible. But, as time went on and the population grew thicker on the soil, there were more people than even the fertile rice-lands could properly support. To-day China has actually to import rice, and many of her people, in spite of their skill and hard work, cannot get enough to eat. Some have emigrated to Manchukuo, where they cultivate the soil in the same careful intensive way. Others have become bandits, or joined the armies that carry on civil war at the expense of the farmers and the citizens. Others have emigrated still farther afield, and have gone to other lands, where their thrifty habits and small needs, born of the long habit of living hard, help them to thrive.

During the last twenty or thirty years factories for manufacturing cotton and other textiles have been built. More attention is also being paid to the better mining of coal, copper, and other minerals that China possesses. But until more and better roads and railways are built, and the country has a more settled government, there will not be enough work for the overgrown population.

The islands of Japan were civilised centuries later than the mainland of China, and the Japanese learned much from their oversea neighbours. Wherever the climate is suitable rice is grown in the valleys. Six-sevenths of the land, however, is mountainous or not suitable for cultivation. Hence the Japanese have not had the same chance to farm as the Chinese. Like the Chinese, however, they depend on rice for food, and cannot grow enough in their own land, even though about a



Map of India, showing how the population is distributed.

third of the land gives two crops of rice a year. The Japanese have become a manufacturing nation. They make especially cotton and silk goods, and make them very cheaply. The new factories have caused some trouble to the farmers, for the farm labourers are flocking into the towns to work in the factories just as they did in England last century.

India is one of the greatest farming countries in the world. Here, as in China, the countryside is crowded with tillers of the soil, and not thinly peopled as are the farm-lands of Britain or Canada. About three-quarters of the huge population of India is employed in tilling the soil or in work connected with it. The people are mainly fed by the crops they grow. These crops are not the same in all parts of the country, but the commonest is rice.

It is possible to grow two or sometimes three crops in the year, and more could be grown if the land could sometimes be given a rest or if more manure could be used. But there are so many people in every village that only small plots of land are possible for each one, and the peasant cannot afford to let the soil rest and grow richer, even though the crops would be much better. The peasants of India have not learned, like the Chinese, to grow different crops in turn, or to collect and use every scrap of manure to enrich the land: much manure is burnt as fuel.

Perhaps one reason for this may be that the people of India are much less certain of their rainfall than are the Chinese, and have to spend much strength and time in irrigation. They store water in reservoirs called tanks, and run it into little channels when it is needed, and where there are wells they make use of the well water in the same kind of way. The British Government has built huge dams to hold up river water till it is needed, and so prevent the dreadful famines that used to happen in former years when the rains failed. In the Ganges region nearly eight thousand miles of irrigation channels have been built. By means of the Sukkur barrage across the river Indus, finished only in 1934, an area as large as Egypt can be watered. Before the dam was built, this area was too dry to be used: it will now be settled and cultivated

About one-third of all the land tilled in India grows rice, but the chief exporting region is Burma. Rice, however, is not the only important crop. Since the canals have been in use in the Punjab great crops of wheat have there been raised for export. Other food crops grown are millet, lentils, peas, beans, and vegetables of every kind: these are eaten by the people themselves, and not usually sent abroad. Then, too, cotton, oil seeds, sugar, jute, indigo, tea, coffee, cinchona (for

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The bed of a river in India which has been dried up by a period of drought.

quinine), and spices are all produced in large enough quantities to be exported.

One very important difference between India and China is seen in the care given to the forests. For forty centuries the Chinese have been cutting down trees, and their forests are now practically all destroyed. In India there was, at one time, much felling of trees, especially to supply fuel for the engines after the railways were built. But seventy years ago the British Government appointed an Inspector of Forests, and now great care is given to replanting trees and to preserving forests.

The Government of India helps the peasant in many ways, besides giving him irrigation works. It encourages co-operative societies, lends money, and tries to teach better ways of tilling the soil. Yet, in spite of all this, the Indian peasant has to work very hard, and he is often, though not always, poor. At the same time he is better off than the Chinese peasant, who receives very little help from his Government. Famines, now a thing of the past in India, still happen in China; terrible floods occur when rivers change their courses or when torrents, with no forests to check them, rush down upon the plains. There are bandits that rob and armies that fight over the fields and ruin the crops.

Another type of dense population, in Western Europe, the British Isles, and parts of the United States of America, is quite different. The people do not live close together evenly spread out on the fertile areas. They do not provide their own food by tilling the soil. They live crowded into great towns or close to the mines, and the country in between the towns is often, as in Britain, very thinly peopled. There are between twenty and thirty cities in the world, each of which has more than a million citizens: London has seven and a half millions.

The people of these crowded areas live on wages earned in mines, factories, or shops, or as transport workers. They depend for their food on other people, from whom they buy it. In Britain such food is often obtained from far-distant lands: beef from Argentina, wheat from Canada, mutton from New Zealand, fruit from South Africa, tea from India, and coffee from Brazil.

Factory life depends on other lands, not only for food, but for raw materials such as cotton, wool, or rubber. Many Lancashire factories would close if they could not obtain cotton from the United States and many Yorkshire factories would close if they could not obtain wool from Australia.

Factory life also depends on other lands to buy the goods that are made. The factories, with their wonderful machines, make such large quantities of goods that they cannot all be sold to the people of the homeland. If markets cannot be found elsewhere for these surplus goods, the factories close, and thousands of workers become unemployed.

For a long time factory hands and mine workers thrown out of work in great numbers at a time had to face poverty and starvation unaided, and very terrible times they had.

But in Britain and in most other West European industrial countries, the Governments have arranged a system of insurance by which men thrown out of work can draw unemployment pay. Hence unemployment for them does not mean what a bad harvest in the Far Eastern countries means for the peasant —death from starvation and famine diseases.

This is not the only way in which Governments in industrial countries look after the workers. Laws are made that limit the number of hours of work, that provide for inspection of factories, in order to see that they are as safe and healthy as possible, and that insure the workers against accident and illness. In the making and carrying out of such laws Britain takes first place in the world.

Other things have to be done for people living in great cities. Water must be supplied in large amounts. Arrangements must be made for sanitation and drainage, to prevent illness. Where so many people live close together, disease would soon spread if the drains were not properly cared for. Streets must be lit at night and kept clean, and the traffic on them must be controlled by police. Buses, trams, and trains must be provided to carry the workers to and from their work. The workers need all these things, and expect to have them, but no one man could manage them for himself.

We can see that the civilisation of western Europe and the United States is by no means simple. It needs, to keep it going, not only the people in the factories and mines, but men of science, business managers, bankers, transport managers, engineers, and many others as well. It is a quite different kind of civilisation from that of the Chinese, the " farmers of forty centuries."

This machine life began less than two hundred years ago. At first it depended on steam, and grew most quickly and strongly in countries which, like Britain, had plenty of coal. To-day, however, many machines are being driven by oil and electricity, and this is causing great changes. Fewer miners are needed and factories need not be built close to coalfields. Factories and railways that are worked by electricity are cleaner and healthier than those that depend on coal: the grime and the soot of the old-fashioned factory town is disappearing.

In some countries, such as France and Germany, there are many factories and great cities, but many of the peasants have remained on the land; agriculture is still carried on by the side of industry. In Britain, however, the first demand for things made in factories was so great that agriculture was neglected. At the time when this happened it did not seem, to most people, to matter very much because food could easily be imported from over the sea. But now, as one country after another has begun to manufacture the things it needs, there is less demand for British goods. British markets abroad are fewer than they were, and it is not so easy as it was to make enough money by selling goods to buy all the food required.

The result is that the neglected countryside is being more thought about, and the British are beginning to try to grow more of their own food. In the last few years, for instance, great strides have been made in canning fruit, vegetables, and chickens. This gives a steady market for farmers growing fruit and vegetables and rearing chickens, and provides work for factories that make tins or can the food. More attention is being given to the production of milk, for which Britain is well suited, and to market gardening. Unemployed factory-workers are learning to till the soil in allotment gardens, so that they may supply themselves and their families with at least some of their vegetables.

We may note, too, that new forests are being planted in Britain to replace those that have been destroyed. In 1934 over fifty million trees were planted. In the future Britain will not need to import nearly all her timber as she does to-day.

All these signs of a return to more work on the land are new, but by the time you are grown up they may have changed, in many ways, the English mode of life.

EXERCISES

1. Colour, on a map of the world, using different colours for each:
(*a*) The densely peopled lands depending on rice cultivation.
(*b*) Those depending on mining and factory industries.

2. Explain why the agricultural lands of North America and Europe cannot support so many people as those of South-east Asia.

3. Mark on a map of Great Britain:
(*a*) The cotton-manufacturing areas.
(*b*) The woollen-manufacturing areas.
Where does the raw material come from, and where are the finished goods exported to ?

4. Why are industrial countries more dependent on other lands than peasant civilisations such as those of South-east Asia ?

CHAPTER 13

WHY WE STUDY GEOGRAPHY

IN the books of this series we have been trying to obtain a glimpse of the many different conditions in which people live and the many ways in which they try to fit their lives to the conditions.

It is easier for us than it was for our grandfathers to know a great deal about the habits and customs of other races or of events that are taking place in one part of the world or another. Aeroplanes and motor-cars can carry us to places far away that were once difficult to reach. News can be flashed by wireless, and business men can talk to each other by telephone, though the oceans lie between them.

The study of geography should leave with us two great lessons, even though we may perhaps forget exactly where some crops are raised or in what part of the earth some mineral is brought to the surface.

The first of these lessons is that most people everywhere are, like those in our own land, quietly going about doing their day's work. It is true that the newspapers tell us little about this and a great deal about things that are exciting or uncommon. We hear of war in China or of riots in India, but these things do not concern many people in either of these countries. The victory or defeat of some army in China is brought about by a few thousands of soldiers. What matters most to the Chinese is the fact that millions of them are steadily tilling the soil, as they have done for hundreds and hundreds of years. A riot in India or the noise made by the politicians concerns but a few hundreds. The rest of the people are not rioting or bothering their heads about politics: three-quarters

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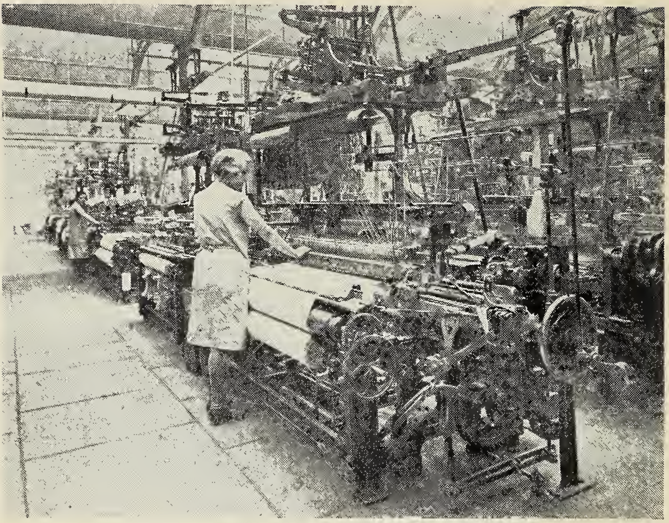
Workers picking cotton in Russia—

of the whole population, for instance, are quietly at work on the land, ploughing and sowing and hoping for good crops.

It is the same all over the world. The papers may be full of stories of murders and robberies and motor accidents, but what the fathers and mothers of most of us are thinking about is how to provide themselves and their children with enough food, clothing, comfort, and leisure.

In industrial countries like those of western Europe and the east of the United States of America, they are thinking about their wages, what they can buy with them, and the chances of being unemployed. In agricultural countries, where the work is largely done by peasants, as in India, the peasant is thinking about seed to sow, whether there will be too much or too little rain, and whether disease will attack his crops or his cattle.



—which will be sent to a factory to be made into cloth—

Farmers, like those of Canada, Australia, and Argentina, who cultivate the soil or rear animals on a big scale, are wondering if there will be a market for their surplus and, if so, whether they will receive enough money for it to repay them for all they have spent on labour, machinery, and transport.

Business men, too, are also wondering about prices and markets.

It does not make any difference whether the farmers are Canadian, Australian, American, or Argentine, or whether the business men are Italian, German, British, American, or Japanese. They are all asking themselves much the same questions and facing the same difficulties.

The second lesson that geography teaches is that " the world is one." No man or woman, in any land, can live completely alone. We all depend on things that others do for us. We should be short of water, clothes, and food, and we should have no gas or electricity at all if other people did not work for us.

It is the same with the nations. We are all linked together in many ways. Robert Louis Stevenson tells a story of a little happening that may serve to show what we mean. At a small village in the Pyrenees the women made a certain kind of lace. For a long time this lace was bought by English women. The lace makers earned a lot of money and their village was full of gaiety. Then the fashion of wearing lace in England went out. The English women bought no more lace, the women of the village earned no more money, and the "mountain merriment" was changed to poverty and unhappiness.

[Courtesy, Messrs. Horrockses, Crewdson & Co., Ltd.

—and then sold in the shops.

This kind of thing also happens on a large scale. If the prices of wheat, cocoa, and rubber go down because people no longer need all that is put on the market, then Americans, Negroes, and Malays all suffer.

Because electricity is being more and more used on the continent of Europe, less British coal is needed, and many British miners are thrown out of work. Factories all over the world cannot find markets for their goods. The men who work in the factories are " stopped " and have less money to spend. When they were at work they bought more of the things that the farmers grew; when they are idle the farmers sell less and receive lower prices for what they sell.

It is hardly necessary to point out that the civilised peoples of the world could not live in the way they do without the help of others who toil for them thousands of miles away: We should have no cotton or rubber for our factories, no tea or coffee for our tables unless someone else produced them. For raw materials and often for food scarcely any nation can depend on itself.

One would expect that by this time all the peoples of the world would have learned this lesson that we all belong to each other. But that is not the case. The truth is, that the growth of communications by aeroplanes, motors, wireless, and telephone has been so rapid that it has brought people into close touch with each other before they have learned to understand and agree.

But they are making a beginning. They are learning to act as one big family to prevent some forms of crime, to stop slavery, to ensure safety at sea, to prevent the spread of germs that destroy plants, animals, and men, and to help on aerial transport.

Some day, perhaps, they will learn that a man is not an enemy because he belongs to another nation, but simply another member of a team that is learning to play the great game of " living together."

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